THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. OCTOBER 12, 1893. CHICAGO, ILL. NUMBER 41.

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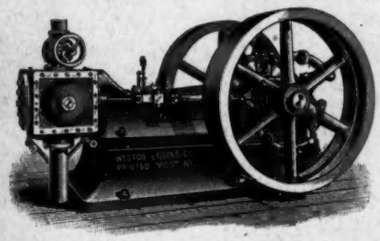

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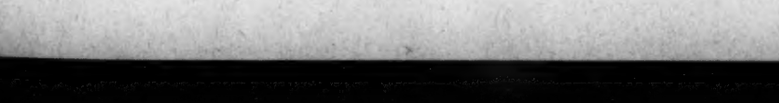

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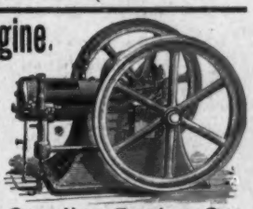

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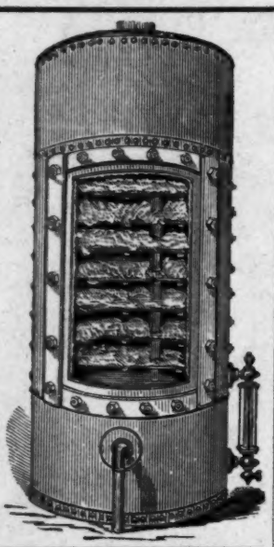

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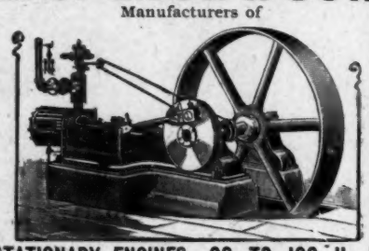

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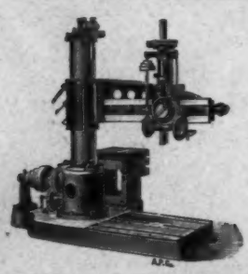

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THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. OCTOBER 12, 1893. CHICAGO, ILL. NUMBER 41.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The iron trade has put in another unsatisfactory week, with little to break the monotony of weak prices and shrunken demand. There is very little danger, in reproducing the substance of going market talk, that errors will be made in quoting below actual transactions; yet the situation is one that gives rise now and then to some very bearish stories which the market is too quick to accept as facts. Such of the mills as are in operation are skirmishing as hard as ever for orders, and with many it is a toss-up between shutting down again and keeping machinery going on the piece-meal business of which order-books are made up. The Pittsburg district has furnished some further resumptions in the past week, including the Apollo sheet mills and the Clinton mill, at which iron is being puddled at $4, and both illustrate the weakening hold of unionism upon the mills. It is evident that there will be little $5 puddling in Western mills the coming year; the proprietor who pays that price simply takes on a handicap, with no compensating advantage. Developments in Pittsburg as to the attitude of manufacturers toward the Amalgamated Association have not been calculated to induce valley and other outside mills to bind themselves to a year's operation under the scale. Some of the scattering mills that signed the scale some weeks ago now find themselves without orders, underbid by non-union establishments in Pittsburg and further east. There is no different tendency in prices to report. Contracts by agricultural and other establishments, for mill products, are unusually late. Would-be buyers have had such low quotations made that their confidence in the stability of the market seems to be shaken and the full amount of intended purchases is not placed. A 2,000 ton bridge order was taken by the Phœnix Bridge Co., at Philadelphia, the past week. The 1,100 tons of plates required go to the Carbon Iron Co., the balance being furnished by the Phœnix Iron Co. A somewhat better feeling is noted at some of the Eastern mills in consequence of the more liberal supply of small orders, and this has led to some inquiry for mill iron from concerns that will continue puddling. Structural material is in light demand at nearly all points. A large amount of projected work is being put off until Spring. Steel rail tonnage is still unsatisfactory. Some straggling orders are noted, and reports are current that $29 at mill has been cut by some producers. The raw iron market is without incident. Coke iron stacks show a further accumulation of 27,000 tons in the month ending Oct. 1, notwithstanding a further reduction of active blast furnace capacity. This promises little backing for the effort of certain Southern producers to hold quotations with more firmness. Sales of several thousand tons have been made to Eastern pipe foundries lately, at figures said to be from $11.50 to $11.75 delivered. The New York report that a syndicate with about 50,000 tons of Southern iron on its hands is about to go on the market is denied, but there is no doubt that certain warrant yard lots, from a few thousand tons up, have been an element of weakness, from the desire of warrant holders to realize.

THE CLEVELAND OUTLOOK.

Mesabi shipments are about the only feature of interest in the ore situation now, and it seems to be conceded by those best able to judge that these will fall between 400,000 and 500,000 tons. With some of these new producers the rate $1 rate on Duluth ore has no deterrent effect, the aim being to get upon the market and into the hands of furnacemen, laying the basis for the larger shipments expected next year. Offerings of Mesabi Bessemers to Eastern furnaces are reported at 7 cents per unit delivered at furnace, equivalent to $3 a ton at Lake Erie ports. These offers were doubtless based on the 50-cent and 60-cent freight rates ruling in August. Transactions involving limited tonnage are reported at $3.25, for Mesabi Bessemer delivered at lower lake ports. It seems to be the calculation among certain Mesabi producers that their ores will be in demand next year to the extent of their output, and there is much figuring on the pulling of pumps at several old-range properties and the scattering of miners, many of whom, it is counted, will never return to the Lake Superior region. Some sales of non-Bessemer ores have been made recently at prices upwards of 50 cents less than those of six months ago, on the same ores. The $1 rate from the head of Lake Superior is attended with shortened shipments. From Marquette there is but little chartering at 85 cents and the Escanaba rate is 65 cents.

Pig Iron. A slight increase in the active capacity of Shenango Valley furnaces has been accompanied by an opposite movement in the Mahoning Valley, though both have all the unsold pig iron furnace owners care to see on the market, the past month having added to the accumulation. Prices are on the basis recently noted, with the demand for gray forge somewhat improved. In charcoal iron very little has been done, and that at terms changing with every deal, and from the present outlook the close of navigation will show very little brought down.

Finished Material. In Cleveland and vicinity there is perhaps more mill activity than for several weeks, but in nearly all cases orders ahead are very scant and manufacturers find difficulty in getting specifications for those recently booked. In bar iron there is no change. No contracts of any size are in immediate prospect in any part of the finished iron trade. Inquiries are of fair volume in structural lines, and some building contracts are about to be let at points tributary to Cleveland. Some little tonnage in rails is also to be noted.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

While very little new business was done in the past week, either in raw or finished iron, dealers are not inclined to feel discouraged, but seem to think that it is only a temporary drop in the volume of business. Structural material presents the weakest front, business in that line being almost nothing. Deliveries are going forward at a fairly rapid rate on all classes of material, and this of itself is an encouraging feature. Collections remain very good, and some of the strongest buyers are discounting their bills. Money seems to be getting more and more plentiful, and at present is considerably easier to get than orders.

PIG IRON.—No large sales have been made for any class of iron, but a considerable number of small orders have been taken for both local and Southern coke. The number of inquiries is a little less than was the case last week, but deliveries are going forward at a very encouraging rate. Several inquiries that were in the market for lots of Southern coke for long deliveries have been withdrawn because deliveries could not be arranged for extending into next year, the furnaces refusing to sell for any longer time than the first of the year. Prices are quiet, and are being quite well maintained.

BAR IRON.—Trade has been quiet in the past week, the demand being limited to small lots. Prices remain at 1.45c to 1.50c for iron, and 1.60c to 1.65c for steel bars, f. o. b. Chicago.

RAILS AND TRACK SUPPLIES.—Business is dull, and the demand is limited to small orders for repairs, etc. Prices remain at $30 to $32 for rails; 2.55c to 2.60c for track bolts; 1.90c to 1.95c for spikes.

STRUCTURAL MATERIAL.—No large contracts are reported, and the demand for small lots has fallen off to a considerable extent. Quotations are the same as last week. Beams, 1.85c to 1.90c; angles, 1.80c to 1.90c; plates, 1.90c to 2c; tees, 2c to 2.10c.

SHEETS.—Black sheets have had a fair sale from store at the last quotations, 2.75c to 2.80c, f. o. b. Chicago. Galvanized sheets are selling quite well, and a few mill orders have been placed. Quotations are 70 and 10 and 5 per cent. discount.

MERCHANT STEEL.—Only a fair business has been done, but a good inquiry is noted. Quotations remain as last reported. Open-hearth spring, 2.25c to 2.30c; machinery, 2c to 2.20c; tire, 1.95c to 2.10c; crucible spring, 3.50c; machinery, 4.50c to 4.75c; tool steel, 6½c and upwards.

PLATES, TUBES, ETC.—A good inquiry is reported from the boiler trade, and a fair number of orders have been received. Prices are: Tank steel, 1.75c to 1.80c; shell steel, 2c to 2.10c; flange steel, 2.25c to 2.30c; fire box steel, 3.75c to 4c; tubes, 65 to 67½ per cent. discount.

OLD RAILS AND WHEELS.—Business is very quiet, and prices are only nominal. Old rails, $14.25 to $14.50; old steel rails, $10 to $13, according to length; old wheels, $13 to $14.

SCRAP.—No business has been done, and quotations are unchanged. No. 1 forge, $10.50; No. 1 mill, $8; turnings, $8; mixed steel, $9; coil steel, $13; leaf steel, $14; low tires, $13.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. Several more mills in and about Pittsburg have started up in part this week and nearly all manufacturers are running in some department. There will come ultimately an increased demand for raw material, as the result of mill operations and some improvement is expected, therefore. The past week has shown very little movement in pig iron. Sellers are holding Bessemer at $12, though one or two transactions in the past few days have shaded that mark. Gray forge is at $10.75 and even below. Steel billets continue weak and $18.50 is still the basis of transactions. On muck bar the quotation is $21. On the whole there seems to be a larger volume of business than in previous weeks, but nothing like a movement toward firmer prices can be discerned as yet. It is believed that the production of raw iron is not more than 40 per cent. of that in the corresponding week last year. Fewer furnaces in this district are in blast than at any time since the depression began. In the Wheeling district there is but little demand for soft steel; a few lots are offered at $19, but on 1,000-ton lots concessions can be had.

St. Louis. The market the past week has been decidedly inactive. There is so little improvement in the general conditions of trade, that a large purchase of material is not favored by manufacturers, and as there can be no reckoning as to future requirements, a hand to mouth buying policy is adopted by nearly all consumers. Prices could not be further reduced without serious loss to the furnaces, and as their product is now sold below cost of production, the market is likely at the bottom.

Cincinnati. The business of the week just closing has been irregular, unsteady and to sellers unsatisfactory throughout. Quite a number of 300 and 500-ton orders for deliveries scattered through the coming four to six months, at prices a little over those current for immediate delivery, have been booked. The car lot trade has been quite active.

Buffalo. We are unable to report any improvement in the pig iron market, and on the other hand, cannot observe any retrograde movement. The volume of business continues light. Here and there consumers are found who are covering future requirements by contracts, but the demand is principally for present wants and in small quantities. As the close of navigation approaches the business in charcoal iron becomes more active, but still below the usual average and at prices which seem ruinous to the makers. So many of the Southern furnaces are going out of blast that it has become difficult to place orders for Southern coke iron for delivery running beyond Jan. 1.

Louisville. A fair amount of buying continues, and the feeling among furnaces is that before long there must be an advance. Consumers during the past week have shown a disposition to buy more freely than at any period for several months, and while many do not consider the position taken by furnaces as correct, and believe that in January prices will be as low, if not lower, than at present, yet they are purchasing, believing that it is not wise to put off buying at least a portion of what they expect to need. In sales recently made prices have not shown improvement, and in some instances a decline, but on tracing these it is evident that they were sales of iron bought by brokers or speculators during the depression, and which they are placing upon the market at the present moment at figures ruling slightly under current quotations. The amount of tonnage of this character, however, is not large, and as soon as exhausted it is believed by furnace companies that they can maintain present prices, and before long obtain a slight advance. This applies especially to the Southern furnaces.

THE IRON TRADE REVIEW

DEVOTED TO

IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

PUBLISHED EVERY THURSDAY BY

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B. M. GARDNER, Associate Editor and Western Manager.

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OCTOBER 12, 1893.

SPASMODIC MILL OPERATION.

The announcement is made in press dispatches that the rail mill of the Lackawanna Iron & Steel Co., at Scranton, Pa., has started up. While this statement is correct it is inadequate, and is characteristically misleading. The mill has started up to roll orders for less than 500 tons in the aggregate, or just one day's work, single turn, running slowly. The management are following this general plan of starting up on small orders, although it is costly, in order to give their men a chance to earn some money, however small the amount may be.—[Iron Age.

If all the mills that have been started by press dispatches in the past two months had started in full and had been kept busy ever since, in all departments, the iron industry of the country might well be expected, by this time, to be in the full tide of prosperous operation. The dispatches have had the same mill started a half dozen times in as many weeks Whenever any department resumed, as material was worked up to the point at which it entered that department, the announcement has gone out forthwith, that the mill in question had again "started up." There has been much in these reports to mislead the public. A census of the unemployed iron workers, in the very districts in which these periodically starting up mills are located, would show how little the resumptions by departments, for the purpose of taking care of a few orders, really amounted to in put ing wages in circulation. We wish every one of the daily newspaper resumptions had been just what the dispatches represented them to be, but we know to the contrary. In many cases idle employes who have read of these resumptions at other points have been led to think that the continued inactivity of their own employers' mills was part of a design upon their wages, while as a matter of fact there were not orders enough on their employers' books to make a start on any wage basis. Had the truth been told it would have been plain that the resuming mill was better off by orders warranting, perhaps, a week's operations; and had the newspapers printed the sequel it would have appeared that the starting mill ran just one week, and then shut down to wait for other orders.

We are glad to note that the number of mills that feel justified in starting up with short force and for short time is increasing, and that even this spasmodic mode of operation has had some slight effect, at length, upon the raw material market.

TRACK LAYING IN 1893.

The *Railway Age*, of Chicago, publishes this very interesting table, showing that in the nine months of 1893 ending with Sept. 30, there were laid in the United States 2,040 miles of new railroad track. The remarkable fact about the record is, moreover, that over 1,000 miles have been laid since July 1, when the scare was at its height:

TRACK LAID IN FIRST NINE MONTHS OF 1893.

State.	Lines.	Miles.	State.	Lines.	Miles.
Alabama	5	46.	Nebraska	2	32.70
Arizona	1	42.	New Hampshire	1	1.
Arkansas	4	12.75	New Jersey	1	2.
California	7	64.32	New Mexico	1	2.54
Colorado	2	16.76	New York	6	31.39
Florida	7	103.50	North Carolina	8	69.60
Georgia	6	62.50	North Dakota	2	194.60
Idaho	1	5.57	Ohio	5	134.70
Illinois	7	64.80	Oregon	1	11.50
Indiana	5	21.10	Pennsylvania	43	364.05
Iowa	1	4.	Rhode Island	1	5.21
Kansas	1	18.45	South Carolina	1	14.
Kentucky	5	25.50	South Dakota	2	62.06
Louisiana	3	8.25	Tennessee	3	17.30
Maine	2	71.50	Texas	6	140.82
Massachusetts	2	11.13	Utah	1	9.
Michigan	1	.50	Virginia	5	16.64
Minnesota	4	42.21	Washington	2	41.90
Mississippi	1	3.	West Virginia	14	76.05
Missouri	7	139.95	Wisconsin	3	19.
Montana	1	27.	Wyoming	1	4.

Total in 42 States and territories, 182 lines..... 2,040.85

That some track laying has been done in each of the 42 States and territories, and on 182 lines, is a showing beyond what might have been expected. Pennsylvania's 364 miles of new track on 43 lines is especially noteworthy. Our contemporary notes that a large amount of grading has been done in this and the previous year on which track has not been laid, and that in ordinary times it would be safe to assume that 50 per cent. more track would go down in the last three months of the year. But in view of the large amount of this work that has been postponed because of the stringency, it would not be surprising if the total for 1893 does not run above 2,500 miles. This, against a total of 4,175 miles of new road on 300 lines, last year. In March of this year a compilation was made which showed that on 164 roads in 35 States and territories, representing 4,804 miles of proposed lines, work had been in progress—grading or otherwise—at the close of last year, or was in progress in March, when the report was made. It is apparent that but a small proportion of these new lines have carried out their plans. Very much of the 2,004 miles thus far laid is doubtless by old lines, that have added sidetracks and other extensions.

If the cutting below $29 at mill for steel rails, which is reported in connection with a few limited transactions of late, were to become the policy of the steel rail manufacturers who are now bound together by an agreement, some little stimulus might be given to track-laying. Bad as the situation is, from causes traceable to the depression, the artificially maintained price is simply an added incubus.

IRON IMPORTS HOLDING UP.

The statement of imports of iron and steel to the United States in August, 1893, as just prepared by the Bureau of Statistics, shows much less diminution in the total, from that for August, 1892, than would be suggested by the state of the iron trade in this country and the depression in all lines of business. As against 36,881 gross tons in August, 1892, the aggregate is 36,130 gross tons, or about 2 per cent. less. No account is taken in the table of iron ore, of which 49,723 tons were imported, as compared with 62,339 tons in August of last year. It is to be noted that the iron ore imports have been uniformly less, month by month, than in 1892. In that year they were less than in 1891, and the total for 1891 was below that for 1890. Now that the tendency has been established in the right direction, it is a poor time to adopt legislation looking

to an added displacement of native ores by importations. The table makes this showing as to raw and finished products:

	Aug. 1893. Gross tons.	Aug. 1892. Gross tons.
Pig iron	6,432	4,109
Scrap iron and steel	328	2,042
Bar iron	2,450	1,221
Steel bars, blooms, billets, etc	1,548	2,409
Wire rods, iron or steel	3,128	3,119
Sheet and taggers iron and steel	3,250	2,061
Tin plates and terne plates	18,994	21,920
Total	36,130	36,881

The falling off in tin plates and a larger importation of sheets, though not a corresponding one, are to be noted as an index of the growing native tin plate industry. Steel bars and billets fell off considerably and scrap iron and steel to a much greater extent. But the fact remains that in a time of greatly depressed trade at home, the aggregate of iron and steel imports is practically the same. And strangest of all, it is proposed to adopt a policy that will still further swell the import list, while thousands of workmen at home are idle because the demand does not begin to require the usual capacity of the mills.

IMPORTANT FOUNDRYMEN'S MEETING.

An announcement from the Secretary appoints the next meeting of the Western Foundrymen's Association at the usual place 702-3 Temple Court Building, Chicago, at 7:30 P. M., Oct. 18, since it has been found inadvisable to carry out the original plan for a meeting at Jackson Park. A feature of the meeting—and one that we believe will repay the attendance of every live Western foundryman—is a paper to be read by Mr. Thos. D. West, on "Progress in the Science of Melting Iron and the Development of Cupola Construction." In this paper, of which proofs are to be sent beforehand to the membership, Mr. West gives the results of some interesting, and as they will undoubtedly prove, most valuable, experiments with a center blast, the construction of which is indicated by diagrams. The paper will touch, also, in its preliminary pages, on the advance made in the application of chemistry to foundry problems.

We bespeak for the paper such a hearing as its importance deserves, since it illustrates excellently the line in which associations of this character ought to be of benefit, Mr. West's paper making public for the first time the results of his investigations in this department of cupola work.

Another matter to come up at the meeting is the report of the Secretary on the sentiment of the membership relative to securing an association chemist. Both the Eastern and the Western Foundrymen's Associations have been wrestling with this problem for some time; and while the desirability of bringing more chemistry into foundry practice is conceded, the practical question of reducing the cost by co-operation does not work out so readily. The discussions in both societies and the papers brought before them in the past few months show plainly that in theory chemistry is a larger factor in the foundry than before, and indicate that the way to securing determinations as they are desired will not long be closed to the progressive foundryman, even though he be not a big one.

THE following from the *American Banker* goes to show that the present is a very poor time to set on foot schemes for reducing revenue receipts:

The monthly Treasury statement shows an increase of $1 million in the public debt. There was a slight increase in receipts during the month over the preceding month. The total receipts were $24 millions and the expenditures $25 millions. The gold reserve for the redemption of greenbacks is set down to $93,582,172. For the first quarter of the current fiscal year the receipts are $79 millions against $98 millions expenditures. For the same period last year the receipts were $99 millions, against $95 millions expenditures. The heavy deficiency here recorded must be credited to the great depression in trade.

From the same authority we have this reassuring word as to the excellent shape in which the banks are getting their affairs, and the indication that the clearing house certificate will soon disappear:

The return of funds to the banks, coinciding with a depressed condition of trade and continued doubt as to the future, results in the steady accumulation of reserves. In New York the excess over the legal requirement already is larger than the sum total of clearing house loan certificates outstanding. The usual course of the reserves after a panic is towards an abnormal increase, and this is now taking place.

THAT the steel plant enterprise at Ashtabula, O., is not a Rockefeller project is well enough indicated by the complete suspension of operations at a time when the conditions were best for pushing out-door work. While announcements are made, with much more circumstance and detail than is usual, of the letting of contracts, even the details of machinery being given, no plans have been put on paper as yet, for any of the buildings. Doubtless it is the part of wisdom to have an enterprise of this magnitude await the development of land deals managed in connection with it, but that is not the order naturally to be looked for were there Standard Oil backing and a purpose to get upon the market at the earliest practical day.

AN English contemporary referring to the record of the Consett Iron Co., for 20 years a leading concern engaged in the supply of shipbuilding material, says that it has been "the most prosperous concern of its kind in the United Kingdom, having generally paid dividends of 20 per cent. to 50 per cent. on the invested capital." Some of our newspapers and stump speakers who find pleasure in calling American manufacturers "tariff robbers," are invited to take a dictionary excursion in search of some epithet that will fitly characterize the absorbing abilities of these free trade capitalists of Consett.

THE Sherman act was a compromise. Doesn't the experience under it suggest the folly of thinking to replace it with another compromise?

THE Muncie Iron & Nail Co., Muncie Ind., went into a receiver's hands Oct. 9. The liabilities are over $100,000, President Darnall says, in his answer to the application, while if the property is sold it will not realize more than half that. A considerable sum is owed for labor. The receivership is said to be the result of the failure of Frank Nelson, the heaviest stockholder.

Business at the Totten & Hogg Iron & Steel Foundry Co.'s works, at Pittsburg, is improving. The company write us under Oct. 10 date: "Orders for rolling mill machinery and rolls are coming in fairly well. Yesterday an order for 30 rolls for one company was received. This would seem to indicate that the iron business is improving."

AT the meeting of the Civil Engineers' Club of Cleveland, Tuesday evening, Oct. 10, F. H. Richards, of Hartford, Conn., read a paper on "The Cam and Its Importance in the Modern Development of Manufactures." W. H. Searles discussed the construction of the Ferris Wheel.

A NEW CASTLE, Pa., dispatch says that the Pittsburg & Lake Erie Railroad and the Etna and Rosena furnace companies have discharged their Italian laborers and filled their places with Americans.

AMONG THE IRON MINES.

Menominee Range:—

A Crystal Falls dispatch says: Just before adjourning the October term of the circuit court for Iron county, Judge Stone ordered Prosecuting Attorney Morarity to conduct an investigation of the Mansfield mine disaster. In his report Mine Inspector Roberts removes all blame for the accident from the operators of the mine, and advances the theory that the accident was caused by the displacement of certain timbers in the shaft while timbers for use in the mine were being lowered. Practical miners now estimate that the course of the Michigamme river can be permanently turned, the bodies of the dead recovered and the mine placed in condition for a resumption of operations at an expense not to exceed $20,000.

The Penn Iron Mg. Co. has shipped something over 270,000 tons of ore this season. The Appleton and Loretto continue to send out ore, and we learn of a new find at the Loretto which considerably increases its value as a future shipper. —[Norway Current.

The fatal accident at the Mansfield mine, in Michigan, where the Michigamme river broke through into the workings and drowned 27 men, ought not to be classed among the unavoidable accidents, for, when mining is carried under a body of water, surveys can be made with enough precision to secure a margin of safety. In this case the mine managers ought not to be acquitted without a very thorough investigation.—[Engineering and Mining Journal.

Mesabi Range:—

The questions at issue between the Standard Ore Co. and the Cincinnati Iron Co., relating to royalty and minimum output, have been settled on a basis satisfactory to the Standard Ore Co. Later operations at the Hale have been attended with an improvement in the quality of the ore.

The Commodore is one of the properties which has kept on a fairly good force most of the season, and their shipments to date aggregate some 65,000 tons. At present a force of about 200 men is employed at this property, and it is the intention of the management to make a record of 80,000 tons for the season.—[Virginia Enterprise.

Mining has been discontinued by the Duluth Ore Co. Shipments of 38,000 tons have been made. An order for 50,000 tons, given some time ago, was countermanded, and the company decided to stop. About 50 men are thrown out of employment. It is probable that the company's Winter work will be confined to sinking a few test-pits.

At the Franklin, operations have been resumed, and it is expected to bring the season's total up to 24,000 tons.

Vermilion Range:—

The Two Harbors shipments in the week ending Oct. 5 were 19,233 tons. Total shipments from Two Harbors docks in September were 97,950 tons of Vermilion and 5,432 tons of Mesabi. Total Two Harbors shipments for the season, 762,299 tons, of which the Mesabi contributed 60,403 tons.

In connection with its mention of the visit of Messrs. Carnegie, Porter, Frick, Morse, Phipps and others to Vermilion and Mesabi mines, the Tower *Iron Journal* says: "In answer to a direct question, President Greatsinger said: 'So far as I know, there is no truth in the story of a Minnesota company consolidation to oppose the Mesabi consolidated mines. The visit of Mr. Porter and his friends had no connection with such a scheme, and the matter was not discussed or considered while we were on the range.' In discussing iron matters Monday afternoon while here, Mr. Carnegie said that while the situation was brightening there was no reason to expect any great change in the iron market before next year. A number of mills are starting up, but it will be several months before there will be a decided change in the demand for iron ore."

Gogebic Range:—

For the week ending Oct. 1 the shipments from Ashland were 33,339 tons, only seven mines shipping in that week. Total for the season 981,859 tons.

The Newport mine closed down Wednesday night and laid off its men. This is the only mine on the Gogebic that was operated throughout the Summer. The contracts taken by the Newport early in the season, calling for 125,000 tons have all been filled.

The ordering forward of 11,000 tons of Ashland ore on an old contract is all the foundation that existed for recent reports of resumption at that mine. The amount will be taken from the stockpile.

Marquette Range:—

At a meeting of the Escanaba River Land & Iron Co., at Negaunee, last week, it was decided to bond the property to the amount of $50,000, the bonds to bear 7 per cent. interest. The company has 12,000 tons of ore in stock, and its total liabilities are $24,000. It owns the property in fee with all its equipment. The deposit has been opened up 500 feet in length and 90 feet in width, and the workings are in ore running 62.70 in iron and .080 in phosphorus. The Swansey and Cheshire are the company's mines.

The Negaunee *Iron Herald* has interviewed Receiver McKinney, of Corrigan, Ives & Co.: "While here he stated that in case his firm came into legal possession of the Buffalo mines an effort would be made to resume mining operations at the earliest possible moment, in order to relieve distress and at the same time secure a working force before all the miners shall have been forced from the country for want of employment. The adjustment is going on as favorably as could be expected during the prevailing depression in the money market. The firm has first-class securities far in excess of all liabilities, and only some trifling change for the better in the supply of money is required to insure a speedy adjustment of their affairs."

The Mill Situation.

A portion of the Apollo Iron & Steel Works, at Apollo, Pa., started non-union on Monday. Two mills will run three turns of eight hours for the present; The company has secured over 300 applications for work. Before starting on this basis, the company formally withdrew from the Iron and Steel Sheet Manufacturers' Association. In this connection it is said that there is some likelihood of other sheet mills starting non-union. Meantime, contrary to his decision announced last week, President Garland has submitted to the sheet mill lodges of the Amalgamated the proposition of the manufacturers for a 10 per cent. reduction in wages. The question of reconvening the conference is submitted at the same time.

The South side mill of the Clinton Iron & Steel Co., Pittsburg, was to be started on Monday with negro puddlers, but the machinery could not be got ready in time. The firm's demand is for $4 puddling; the employes asked for a sliding scale with a $4.35 minimum and $4.75 maximum. A start was expected on Wednesday, Oct. 11, on a non-union basis, at the $4 rate.

The proposition of the Union Iron & Steel Co., of Youngstown, O., to start its mills at Amalgamated Association prices, but without signing the scale for a definite time, was discussed for two days by the members of the Finishers' Union, but was finally rejected. The men decided to submit a counter proposition, but its provisions are not known. Many of them are willing to accept the 10 per cent. reduction but they want an assurance for the future and a formal scale signature.

At the Warren, O., mill of the Union Iron & Steel Co., a notice has been posted that as nothing definite is known as to when the mill would resume, the men could look for work elsewhere.

The Falcon Iron & Nail Co., of Niles, O., posted a notice of a 10 per cent. reduction, beginning Monday, in all wages not covered by the Amalgamated scale.

The Penberthy Injector Co. say in their October *Bulletin:* "We are gradually increasing our force of workmen as the orders begin to flow in, and expect to be running on full time again before the holidays. We have improved the dull times by looking about for new specialties in the line of steam brass goods, and expect soon to place on the market one or two articles for which there is a great demand, and of the quality of which the record of our present goods should be sufficient guarantee."

SILICON AND CARBON IN IRON.

We condense from the London *Iron and Steel Trades Journal's* account of the autumn meeting of the Iron and Steel Institute, at Darlington, the following interesting discussion on "Carbon in Iron." It followed a paper on that subject by Prof. A. Ledebur, of the Royal Mining Academy, Frieburg, Germany.

Mr. G. J. Snelus said there were several statements in the paper with which he could not agree. Prof. Ledebur asserted that the silicon formed a necessary constituent of grey pig iron, but only a brief period of time had elapsed since the important part played by the silicon in grey pig iron had been recognized, a recognition due to observations made partly by himself and partly by others. He was able in 1879 to remark that the presence of silicon in pig iron diminished its capacity for taking up carbon, and, on the other hand, it was necessary for the formation of grey pig iron. Pig iron free from silicon remained white after slow cooling, and grey iron changed into white if the silicon was abstracted. From this the deduction followed directly that if the molten white pig iron had the opportunity afforded it of taking up silicon it would change into grey pig iron. That effect had been discussed very often at the Institute meetings, and if his memory served him right it was discussed long before 1879, and that he contributed a paper to a meeting 10 years before clearly explaining the action of silicon on the carbon in the form of graphite. Therefore the Professor could hardly claim his paper to be a discovery. There was no doubt they had considerable difficulty in explaining the effect of carbon in hardening steel, and a great many more experiments and tests were required before they could come to the conclusion that the carbon found upon the surface of a fractured piece of iron, shown by the microscope, was anything more or less than graphite carbon.

Mr. R. A. Hadfield (Sheffield) said it seemed to him that the determination of the different kinds of carbon was of high importance, as being a problem bearing upon some of the methods of making steel. During a visit to the United States of America he found one of the great car-wheel makers paying special attention to the subject with advantage. One would have thought that silicon in steel would exert the same modifying influence as on iron, yet they found the reverse effect on steel.

Prof. Roberts-Austen, noting the Professor's reference to the hardening effects of carbon on steel said that those who knew the views which had been put forward by himself and Mr. Osborne, and which had met with more or less favor, would know that in their opinion that did not explain the hardening of the steel. It might go far towards an explanation, but it certainly was not the whole question. When the carbon entered into intimate alliance with the iron, and when the iron was rapidly cooled, they had the hardening effect, but they could hardly accept the statement that the mere relations of the carbon and the iron apart from any molecular change in the iron could be said to explain the hardening of the steel.

Mr. J. E. Stead said the paper was a summary of knowledge that had been gathered together during the past few years. He differed from the author in describing temper carbon as a separate modification. He could not regard it as anything but graphite, because after being removed and rubbed over paper it gave the graphite streak, and was exactly like graphite in its behavour towards nitric and hydrochloric acid. Therefore he thought they should abandon the term temper carbon, because it had been proved that it and graphite were the same thing.

Sir Lowthian Bell said it was a well-known fact that they could separate carbon from white iron without any admixture at all, as he had proved by the slow cooling of a large mass of the metal.

Mr. Turner said that the fact that silicon rendered white iron grey was known before the Institute was started, but he claimed that it was not until after the experiments of Mr. Wood, aided by Mr. Stead, and after his own experiments, that the fact was practically applied with success by the German founders. His own experiments in connection with iron that had been annealed certainly tended to prove that the graphite obtained from that kind of iron was different from that kind of iron was different from the graphite obtained from grey iron. They were both graphite, but in different forms, and that he understood was the only contention in Prof. Ledebur's paper.

Mr. E. Riley said some years ago he made some experiments on the subject, and there was no doubt that as the silicon increased it drove the carbon out in the form of graphite.

Awards at the World's Fair.

The long line of Fay and Egan awards from 1851 down to the "grand prix" at Paris 1889, has been added to by the capture of the "grand honors" at the World's Fair. This record J. A. Fay & Egan Co. of Cincinnati, O., have reason to be proud of, for it is one that cannot be shown by any other concern of its line in the world. The woodworking machinery made by this company has reached a state of proficiency and perfection of construction that has no equal on either side of the Atlantic.

The judges decided, after careful examination and thorough test, that the J. A. Fay & Egan Co. machinery possessed the most essential conveniences and that it expressed the latest results of American ingenuity in every particular, whereby time and labor can be saved to the best advantage.

This decision was not unexpected, for having been so successful in the past, there was not a doubt but that the machines shown would take the "premier medals," for superiority over all competitors. An important feature in this connection is that the chairman of the judges is a wood working machinery manufacturer himself and known as an expert, and he saw the wonderful advancement made and agreed with the full committee that recognition should be had to the fullest extent, hence the grand awards. The following is a partial list of the machines :

J. A. Fay & Co. Department :—No. 4 eight roll triple cylinder sand papering machine ; Hollow chisel car mortising and boring machine ; Automatic double cutting-off saw machine (for car and bridge work.); No. 6 fret scroll sawing machine ; triple cylinder six roll "Lightning" flooring machine ; large sill and timber dressing planer ; Automatic dovetailing machine (self-feeding) etc., etc.

The Egan Co. Department :—Improved universal woodworker ; No. 10 double planer and smoother, with broken roll and chip breaker ; No. 6 band re-saw (capacity 40,000 feet per day.); Car gaining and tenoning machine ; Automatic spoke lathe, record of 2,695 spokes per day ; Sand-papering machine, with brush attachment ; Heavy timber planer, with eight powerful feed rolls ; Reciprocating No. 3 scroll saw machine, etc., etc.

A Well Equipped Ohio Foundry.

When Aultman, Miller & Co., mower and reaper manufacturers of Akron, O., resume operations this month, they will occupy for the first time one of the most commodious and convenient, and one of the largest foundries in the country. The building was under construction last year, and is now fully equipped and in readiness. It is 400x100 feet, the molding room being 300x100. The remaining 100 feet of length is taken up with pattern rooms, core room, tumbling room, etc., are well lighted and arranged for the most convenient service. The molding room is high and full of light, the roof being of clear story construction, while the side walls are full of long windows. The cupola is the Whiting, furnished by the Detroit Foundry Equipment Co., and 55 tons of iron will be melted daily. The maximum melt in the old foundry of the company is 38 tons a day. For heating and ventilating the equipment is complete and well constructed, the Sturtevant system being used, put in by E. H. Jones & Co., of Cleveland. The Hayes iron carrier, the invention of the foreman of this foundry, will be used for the rapid distribution of the hot iron, an overhead track being em ployed, with a trolley underneath, to prevent the jumping of rolley above. The stock rooms are built out on either side of the cupola, their floors being at the proper charging level. In all particulars the foundry is fitted with a view to convenience and economy of operation.

THE old rail mill at the Edgar Thomson Steel Works started up Oct. 10 with 300 men.

FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Foundrymen's Association, held at the Manufacturers' Club, Philadelphia, on Wednesday night, Oct. 4, was fairly well attended. President Schumann and Secretary Evans were both absent, but their places were very ably filled for the time by Vice President Devlin and Mr. Vansant. Among those present were:

Mr. J. S. Stirling, of Harlan, Hollingsworth Co., Wilmington, Del.

Mr. H. C. Vansant, of Morris, Tasker & Co., Philadelphia.

Dr. Edward Kirk, Philadelphia.

Mr. Thomas Hobson, *Iron Age*, Philadelphia.

Mr. W. C. Henderson, of Thomas Devlin & Co., Philadelphia.

W. J. W. Moore, Crane Iron Co., Philadelphia.

H. M. Capp, West End Rolling Mill, Lebanon, Pa.

Henry Ruhland, of H. Ruhland & Co., Philadelphia.

T. A. Daly, *The Iron Trade Review*.

C. R. Baird, of Chamberlain, Turney & Baird, Philadelphia.

Thomas Devlin, of Thomas Devlin & Co.

W. H. Green, Jr., Vulcan Works, Chester, Pa.

A. W. Whitney, of A. Whitney & Sons, Philadelphia.

P. D. Warner, Mellert Foundry Co., Reading, Pa.

Charles Schmidt, of Henry McShane Manufacturing Co., Baltimore.

Mr. Riehle, of Riehle Bros., Philadelphia.

Mr. E. P. Pfaehler, Philadelphia.

Mr. Vansant, secretary pro tem., read a letter from Prof. MacAlister, of the Drexel Institute, bearing upon the question introduced last month of arranging with the Institute to make determinations of specimens for the foundrymen. Prof. MacAlister stated that he had conferred with the professor of chemistry at the Institute, and thought that he could without difficulty make the arrangement suggested by the association. The matter will first have to be acted upon, however, by the board of managers, which will not meet for two weeks. Prof. MacAlister said that he was greatly interested in the matter, and believed he could organize the work in such a manner as would mutually benefit the Institute and the Foundrymen's Association.

When the reports of the various committees were called for, Mr. Whitney, of the Committee on Car Wheels, was the only one to respond. He reported no business and prices never lower. Mr. Whitney added, apropos of Prof. MacAlister's letter, that he had had a talk with Mr. Spangler, of the University of Pennsylvania, relative to the same matter. Mr. Spangler, he said, had taken up the question with Prof. Smith, and the latter had said he would be only too glad to do the work for the foundrymen, but at present the laboratory was as full as could be managed. In case the foundrymen did give the work to the University, it would be done at the lowest possible cost that would cover expenses. Mr. Smith preferred that the association guarantee the expenses of $650. This would pay, say, $500 for the services of an additional man, and leave $150 for incidental expenses.

As far as making mechanical tests was concerned, Mr. Smith said if samples were sent to Mr. Spangler he would be willing to do the work free of charge, and far from considering the work a bother, he would, on the contrary, hold it as a favor. Since the University is training up young men who in future will be of benefit to foundrymen, he believed the former could not be brought in too close contact with the latter. So, as far as mechanical tests are concerned, Mr. Spangler said, the foundrymen are free at any time to ask him to make them. The work would be done more expeditiously, however, if one man were paid to devote all his attention to it.

Mr. Vansant moved that Profs. MacAlister, Spangler and Smith be invited to attend the next meeting of the association to give their views on the matter. The motion was unanimously carried.

Apropos of the proposed trip of the association to Chicago, the secretary read a letter from the secretary of the Western Foundrymen's Association, under date of Chicago, Sept. 25, as follows: "At the meeting of the Western Foundrymen's Association held last Wednesday, it was decided, if possible and advisable, that the October meeting be arranged for to be held in the rooms of the Associated Engineering Societies, in the Mining Building at the World's Fair. In case this is done, efforts will be made to have the meeting recognized by the appointment of Foundrymen's Day by the Exposition, and to have the Mining Building open in the evening. Arrangements will also be made to have one or two important papers read, and invitations to attend the meeting will be sent very widely throughout the West. The Philadelphia organization will be invited. Please let us know how many of your members will attend."

It seemed to be the general opinion of the members that very few foundrymen from this section of the country would care to attend, as the proposed trip of the association to the Fair had long since been abandoned. It was decided, however, to write to Secretary Evans, who is in Chicago, to remain over and represent the association on "Foundrymen's Day."

Dr. Edward Kirk then read an interesting paper, which was generously applauded and for which a vote of thanks was tendered. It is as follows:

Fluxing of Iron in Cupolas.

Flux is the term applied to a substance which imparts igneous fluidity to metals when in a molten state, and has the power to separate metals contained in metallic ores from the non-metallic substances with which they are found in combination; also to separate from metals when in a fluid state any impurities they may contain. Fluxes are also used for the purpose of making a fluid slag in furnaces to absorb the non-metallic residue from metals or ores and ash of the fuel, and removing them from the furnace to prevent clogging and keep the furnace in good working order for a greater length of time. The materials used as fluxes for the various metals are numerous and varied in nature and composition, but we shall only consider those employed in the production of iron and the melting of iron for foundry work.

The substances employed for this purpose are numerous, but they consist principally of the carbonate of lime in its various forms, the principal one of which is limestone.

In the production of pig iron from iron ore in the blast furnace, limestone is used for the two-fold purpose of separating the iron from the ore and for liquefying and absorbing the non-metallic residuum of the ore and ash of the fuel and carrying them out of the furnace. For this purpose large quantities of limestone are put into the furnace with the fuel and ore. The stone melts and produces a fluid slag, which absorbs the non-metallic residuum of the ore and ash of the fuel in its descent to the bottom of the furnace. Thence it is drawn out at the slag hole, and carries with it all those non-metallic substances which tend to clog and choke up the furnace. By this process of fluxing the furnace is kept in good smelting order for months, and even years. Were it not for the free use of limestone, the furnace would clog up in a few days.

The blast furnace is a cupola furnace, and is constructed upon the same general principle as the foundry cupola. Foundrymen long ago conceived the idea of using limestone as a cupola flux. In many foundries it is the practice to use a few shovels or a few riddles of finely broken limestone in the cupola on the last charge of iron, or distributed through the heat, a few handfuls to each charge of iron. The object in using limestone in this way is not to produce a slag to be drawn from the cupola, but to make a clean dump and a brittle slag or cinder in the cupola, that can be easily broken down and chipped from the lining when making up the cupola for a heat.

Limestone used in this way does not produce a sufficient quantity of slag to absorb the dirt from the iron and ash of the fuel and keep the cupola open and working free, but rather tends to cause bridging and reduce the melting capacity of the cupola.

The making of a brittle cinder in a cupola by the use of limestone depends to a great extent upon the quality of the stone. Some limestones have a great affinity for iron and combine with it freely when in a molten state, while others have but little affinity for iron and do not enter into combination with it at all. In the cinder piles about blast furnaces we find cinder almost as heavy and hard to break as iron, resisting the action of the atmosphere for years; while at others we find a brittle cinder that crumbles to pieces after a short exposure to the atmosphere, or even slacks down like quicklime when wet with water. In a cupola we may have a hard or

brittle cinder produced by limestone. The results obtained from the use of limestone in small quantities in a cupola are so uncertain that I do not think they justify the foundryman in using it.

LIMESTONE IN LARGE QUANTITIES.

The tendency of slag or cinder in a cupola is to chill and adhere to the lining just over the tuyeres and around the cupola at this point, and prevent the proper working of the furnace. So great is this tendency to bridge that a small cupola will not melt properly for more than two hours, and a large one more than three hours. To overcome this tendency to clog and bridge, foundrymen in many cases have adopted the blast furnace plan of using a large per cent. of limestone as a flux in their cupolas and tapping slag.

When a large per cent. of limestone is charged with the iron in a cupola, it melts when it settles to the melting point and forms a fluid slag. This slag settles through the stock to the bottom, and in its descent melts and absorbs the ash of the fuel and dirt or sand from the iron and carries them to the bottom of the cupola, where the slag and dirt it contains may be drawn off and the cupola kept in good melting order and in blast for days at a time. The amount of limestone required per ton of iron to produce a fluid slag depends upon the quality of the stone and the condition of the iron to be melted. It is the custom in some foundries, where the sprews and gates amount to from thirty to forty per cent. of the heat, to melt them without milling to remove the sand, and to use enough limestone in the cupola to produce a sufficient quantity of slag to absorb and carry out of the cupola the sand adhering to them. In this case a larger per cent. of limestone is required than would be required if the sprews and gates were milled and only clean iron melted. Poor fuel also requires a greater amount of slag to absorb the ash than good fuel, and a lean limestone must be used in larger quantities than a stone rich in lime. The quantity required to produce a fluid slag, therefore, varies with the quality of the limestone and the conditions under which it is used, and amounts to from 25 to 100 pounds per ton of iron melted.

The weight of the slag drawn from a cupola when the sprews and gates are not milled, and the cupola is kept in blast for a number of hours, is about one-third greater than the weight of the limestone used. When the sprews and gates are milled, the weight of the slag is about equal to the weight of the limestone. When the cupola is only run for a short time and slag only drawn during the latter part of the heat, the weight of the slag is less than the weight of the limestone.

The slag drawn from a cupola has been found, by chemical analysis, to contain from 4 to 7 per cent. of combined iron and numerous small particles of shot iron mechanically locked up in the slag. These cannot be recovered except at a greater cost than the value of the metal. In a number of tests made in the same cupola, I found the loss of iron to be from 3 to 4 per cent. greater when the cupola was slagged.

EFFECT OF FLUX UPON IRON.

Many of the limestones and other mineral substances employed as cupola fluxes contain more or less finely divided oxides, silicates, etc., in combination with earthy materials. The flux is often reduced in a cupola and its component parts separated and in minute quantities they alloy with the iron and injure its quality. The conjoined effect upon iron of these diffused oxides, silicates, etc., liberated in a cupola from their native elements in fluxes, is to prevent the metal running clean in the mould or making sharp, sound castings and the tensile and tranverse strength is frequently impaired by them. When the oxides, silicates, etc., are not separated in the cupola from their native elements, they do not impair the quality of the metal nor do they improve it. The tendency of the cupola furnace is to clog and bridge over the tuyeres, and concentrate the blast upon the iron through a small opening in the center and injure its quality. If by the free use of limestone we prevent bridging and keep the furnace working open and free we avoid injuring the iron in melting by the concentration of a strong blast upon it. The effect, therefor, of limestone in a cupola is not to improve the quality of iron but to prevent its deterioration in melting.

THE ACTION OF FLUXES ON LINING.

Limestone and other minerals employed as fluxes frequently contain impurities which enter into combination with the lining material of a furnace and render it fusible. This was illustrated at the foundry of John D. Johnson & Co., Hainesport, N. J., a few weeks ago. The cupola front had been put in with new moulding sand for a long time and no flux used in the cupola. The sand made an excellent front that resisted the action of the heat and molten iron upon it. As the heats enlarged, it became necessary to use flux and tap slag to run off the heat. Oyster shells were used and produced a slag that flowed freely and had no effect upon the sand in the front. When the supply of shells became exhausted, a limestone was used in place of them. Trouble then began with the front. It was melted by the flux into a thick, tough slag that settled down and closed up the tap hole and iron could only be drawn by cutting away a large portion of the front to enlarge the tap hole. Mr. Johnson called at my office to learn what could be done to keep the tap hole open. I advised that the front material be changed and a mixture of fire-clay and sharp sand be used in place of moulding sand. This was done and there was no further trouble in keeping the tap hole open and in good order to run off the heat. This serves to illustrate the effect of fluxes upon lining material. With no flux and with oyster shells the moulding sand resisted the heat and pressure of molten iron and slag upon the front. But with limestone it melted into a thick, tough slag. This was due to some property in the limestone entering into combination with the sand and making it fusible. Had the cupola been lined with this moulding sand, the entire lining would have been cut out in one heat, while it would have stood many heats with shells on no flux at all.

From the various qualities of cupola brick and lining material now in the market, a lining may be selected that will resist the action of almost any flux or slag, and foundrymen may select a flux to suit the lining or a lining to suit the flux, whichever they find to be the most profitable in their locality.

HOW TO SLAG A CUPOLA.

Foundrymen sometimes experience trouble in slagging their cupolas. This is largely due to a lack of knowledge in charging the limestone and drawing the slag, for any cupola can be slaged if properly worked. To draw slag from a cupola a sufficient quantity of limestone or other slag-producing material must be charged in the cupola with the iron to make a fluid slag. The exact amount required can only be learned by experimenting with the fluxing material used, but it is generally from fifty to sixty pounds of good limestone per ton of iron, when the remelt is not milled. The limestone is generally charged on top of the iron and put in with each charge after the melter begins using it. No limestone is used with the iron on the bed or first few charges of iron. In small cupolas limestone is generally charged with the second or third charge of iron. In large cupolas, when the charges of iron are light, six or eight charges, or generally about one-sixth of the heat, are charged without limestone. This is the way limestone is used when the cupola is run in the ordinary way for a few hours. When the cupola is run for some special work, the limestone is charged in a number of different ways.

The slag is drawn from the cupola through an opening known as the slag-hole. This opening is made through the casing and and lining under the lower level of the tuyeres and at a point in the cupola where it will be out of the way in removing iron from the spout and convenient for removing the slag. The height the slag hole is placed above the sand bottom depends upon how the iron is drawn from the cupola. When it is desired to hold iron in a cupola until a sufficient quantity is melted to fill a large ladle, the slag hole is placed high, and when the iron is drawn as fast as melted the slag hole is placed low. When the slag hole is placed high, slag can only be drawn as the cupola fills up with iron and raises it to the slag hole. When the iron is withdrawn from the cupola, the slag falls and the slag hole is closed with a bod to prevent the escape of blast. When the iron is drawn from the cupola as fast as melted the slag hole is placed low and when opened it is permitted to remain open through the remainder of the heat. This is the best way of drawing slag from a cupola, for the flow is regulated by the amount of slag in the cupola, and if the hole is not made too large, there is no escape of blast.

The slag in the bottom of a cupola takes up impurities from the fuel and iron and if permitted to remain in the

cupola for too long a time it may become so thick and mucky it will not flow from the slag hole. Or it may be filled with impurities, become over-heated, boil up and fill the tuyeres with slag; and when boiling, it will not flow from the cupola through a small slag hole. The time for drawing the slag from a cupola is therefore a matter of great importance. The slag hole is generally opened in from half an hour to an hour after the cupola begins to melt, and when placed low is permitted to remain open through the remainder of the heat. When placed so high that slag can only be drawn when the cupola fills up with molten iron, it should be opened as soon as the slag begins to rise and closed as soon as it falls below the opening.

DOES IT PAY TO SLAG A CUPOLA?

Nothing is gained by slagging a cupola when the sprews and gates are milled and the heat can be melted successfully in the cupola without slagging, but a great saving in labor and wear and tear of machinery can be effected in many foundries by melting the sprews and gates with the sand on, and slagging to carry the sand out and keep the cupola working free. A cupola can not be made to melt iron faster by slagging, but it can be kept in blast and in good melting condition for a greater length of time and a much larger amount of iron melted by slagging. Foundrymen who find their cupolas temporarily too small to melt the quantity of iron required for their work can overcome the difficulty by slagging the cupola and keeping it in blast for a greater length of time.

In endeavoring to make an estimate of the cost of slagging a cupola, I found that the cost of limestone in different localities varied from 50 cents to $3 per ton. The amount used varied from 25 to 100 pounds per ton of iron melted. The amount of slag drawn varied from 25 to 100 pounds per ton of iron. The iron combined with the slag varied from 4 to 7 per cent. With these wide differences in the cost and quantity of limestone used, and the difference in the quantity of slag drawn and per cent. of iron it contained, I found it impossible to make an estimate that would be of any practical value to foundrymen. Such an estimate must be made at each foundry to be of any practical value.

SHELLS.

Oyster, clam and other shells are largely composed of lime, and are frequently used as a flux in place of limestone in localities where they can be procured at a less cost than limestone. The shells are charged in the same way as limestone and in about the same proportion to the iron. They may be used in place of limestone either in large or small quantities, and have about the same effect upon the iron and cupola as limestone. When used in large quantities, they produce a fluid slag that keeps the cupola working free and flows freely from the slag hole, carrying with it the refuse of melting that clogs the cupola. When the heat first strikes shells in a cupola, they produce a crackling noise and flakes of shell may be seen to pass up the stack, and the foundry roof, when flat, is often covered with flakes of shell after a heat, when shells are used in large quantities. The crackling is due to the destruction of the hard inner surface of the shell, the flakes thrown from the cupola are entirely of this surface and the loss of shell is not as great as it would appear to be at first sight. The remainder of the shell melts and forms a fluid slag that absorbs the refuse of melting, becomes thick and helps to clog up a cupola when the shells are used in small quantities, or assists in keeping it open when used in large quantities.

MARBLE SPALLS.

Marble is another of the carbonates of lime and the spalls or chippings from marble quarries or works are quite extensively used in some localities as a cupola flux. Their action in a cupola and effect upon iron is very similar to that of limestone, and they are used in the same way and in about the same proportions. There are a number of other substances, such as fluor-spar, feld spar, quartz rock and a number of chemical compounds that are used as cupola fluxes; but I fear I am taking up too much of your time and shall leave these fluxes for consideration at some future occasion.

Under the head of new business, the labor and wage question was brought up for discussion.

The discussion was opened by Mr. Wanner, of Reading, who said: "It has been said repeatedly, and I am sure there is truth in the statement, so far as the cast-iron pipe business is concerned, that there has been a depression since 1887. And during this time losses have been principally met by the manufacturers who have been cut in prices. But labor has remained the same, and has suffered only within the last four or five months since the beginning of the financial stringency and panic. Then labor was reduced. The employer's most unpleasant duty is to reduce wages. I am sure that is the way I have felt, and it seems to be the experience of all with whom I have spoken. It is unpleasant for you, for the workman, and the community. Everybody talks about it and holds you up as a tyrant and oppressor of the poor.

"A reduction in a workman's wages affects not only the man himself, but also the various tradesmen with whom he deals. But when we meet such times as we have had lately, many undertake to follow that course and have to. The workingman is cut down. It is a question whether it is policy to reduce wages or whether there is a necessity for it. If it is deemed necessary to reduce wages simply to prevent the importation of cheap labor, or to avoid coming in contact with foreign labor, then I question the policy of it. If there is overproduction, then I say, shut down those branches of the business in which the overproduction exists.

"Wages in this country may be upheld, and there is no real necessity to reduce, or to depress the working people. We have not yet reached the necessity for it. When you are losing money, you feel bad about it, and feel inclined to be harsh with your workmen. But when you reflect upon the result you become doubtful as to the policy of such a course. If we are driven to the position of the old country then we might do it. Incidental to this I think we might consider in a friendly way the tariff question. I do not believe after what manufacturers have suffered lately, that they will ask for protection. If there be any protection, let it be only to keep up wages, and make up the difference between the wages of this country and Europe. The higher you keep the wages, the more prosperous the country." At this juncture, the chairman informed Mr. Wanner that he was out of order, after Mr. Pfaehler had questioned Mr. Wanner's tariff theories. Mr. Riehle moved that the future consideration of the wage question be referred to the Executive Committee, so that the matter might be brought up more fully at the next meeting. "I would like wages to be reduced" said Mr. Riehle "unless prices go up."

The matter was finally referred to the standing committee.

A letter from Congressman Bingham, of Pennsylvania, to Secretary Evans, was read. Mr. Bingham announced himself in full accord with the recently expressed sentiments of the association on the financial question and would do all in his power to further the repeal of the silver purchase clause.

Great Casting for the Carnegie Forging Press.

A mammoth casting for the great hydraulic forging press the Carnegie Steel Co. is to erect at the Homestead plant arrived at New York some time ago, and is now lying on dock waiting for the construction of a car to transport it. The casting weighs 64 tons, and was imported by the Carnegie Co. for the manufacture of armor plates for the United States Navy. It is a part of a hydraulic forging plant, and measures 16.6x11.6x3.6 feet. It was made by Sir Joseph Whitworth & Co., at Openshow, Eng It is expected that there will be considerable difficulty in getting the big casting across the river. It will probably be taken over to Jersey City on the derrick float of a wrecking company.

The Pennsylvania Road has several great gun trucks which can carry half again as much as the 64 tons in this casting, but its dimensions make them of no value. If loaded sidewise, the casting would extend too far across the tracks. If loaded on end, it would be too high. So the men in the Altoona car shops took two gun trucks and built a massive bridge between them. On this bridge the casting can be loaded on edge, the bottom of the bridge being just high enough to clear the rails. The Cufic and Nomadic have been bringing sister portions of the casting over for the last three trips. The whole machine weighs 1,500 tons.

AT Baltimore, a receiver has been asked for the South Baltimore car works. Liabilities are $294,624.59 and assets $617,181. The works have a capacity of 3,500 freight cars a year.

PROTECTION AGAINST FIRE.

The New York World Building is a monument to the enterprise of American journalism, and is a model of architectural and mechanical perfection. It is perhaps the most complete in its appointments of any of its kind in America, and its occupants enjoy every convenience and protection that brains have devised and money can purchase. With its rock walls, fire-proof floors, automatic sprinklers, burglar and fire alarms, and watchman, it would seem that the building would be proof against damage by fire or other accident. The management, however, are not satisfied in having a watchman alone, but were determined to have some positive evidence that he is attending to his duties and properly guarding the property left in his charge. In the office of the manager will be found the recorder of the Pneumatic watchman check, which tells the story each morning of the watchman's whereabouts during the night. The Pneumatic Watchman Check Co., Columbus, Ohio, take pride in the adoption of their check by the management of the *World*, as well as by that of the New York *Commercial Advertiser*, in whose office will also be found in operation one of their checks. The new Times Building, Chattanooga, Tenn., is one of the finest of its kind in the South, and Mr. Adolph S. Ochs, publisher of the *Times*, was quick to see the necessity of having some check on the watchman who has charge of this valuable property. After investigating various devices for this purpose, he placed his order with the Pneumatic Watchman Check Co., and the occupants of this building feel the more secure against loss by fire or otherwise. The *Tradesman* is also published in the new Times Building, and joins in the appreciation of the protection afforded by this unique device.

Probably no one who has visited Columbus, O., noted for its fine residences and second in the union in the matter of paved streets, has failed to notice the new Ohio State Journal Building. In its office will also be found a Pneumatic watchman check. This check has been adopted also by the owners of the Minneapolis Journal Building, by the publishers of the San Francisco *Examiner*, the Pittsburg *Leader*, and a long list of others. These buildings are named because they are new, and demonstrate the growing disposition on the part of proprietors of new and valuable property to equip it with the latest and most efficient device for protection against damage, it being generally conceded that watchmen cannot be absolutely depended upon unless there is some sort of a check on them.

The trustees of the Ohio State institutions, in whose care are intrusted hundreds of insane, imbecile, blind, deaf and dumb, appreciate the responsibility resting upon them in caring for these unfortunate people, and have left nothing undone to afford the greatest protection. The Pneumatic Watchman Check Co. has just completed equipping the Ohio State Institution for Deaf and Dumb with a large check, and the trustees have expressed their satisfaction and feeling of security in its operation. This check meets with a large sale throughout the United States.

Connersville Blower Co.'s Complete Plant.

The new works of the Connersville Blower Co., Connersville, Ind., are fully equipped and they are ready to fill orders on all sizes of their blowers. They have a complete mac e shop, pattern shop and foundry, and all fitted with the latest tools and appliances and will employ 75 to 100 men. They have a first-class blower and as an example of the good work they turn out they have just shipped a large one to Warder, Bushnell & Glessner, of Springfield, O., their blower having been selected by Mr. Bauer, the general manager, in competition with other makes as calculated to give great efficiency and being very economical in power. As Mr. Bauer stands high as a mechanic, the order is justly regarded as emphatic testimony to the merits of the Connersville blower.

AT a meeting of freight agents of the Pittsburg, Mahoning valley and Shenango valley districts at Pittsburg last week a reduction was made from 6 to 5½ cents per 100 pounds, in carload lots, on iron from any of the mills in the Mahoning and Shenango valleys to Homestead, Bessemer, Braddock and Rankin, Pa.

WORLD'S Fair attendance, Oct. 9, was 751,026.

IRON SMOKE STACKS.

As a general rule, brick chimneys are greatly to be preferred to iron stacks, but there are many cases in which they cannot be used, or in which their use would involve prohibitive expense. Thus the nature of the soil may be such that a proper foundation for a brick chimney cannot be had without an ernormous oulay of money. Again, a chimney of some kind may be wanted for temporary use only, to provide additionol draft pending the construction of a new chimney, or for some other purpose. In these cases iron stacks are often useful, both on account of their cheapness, and because they they can frequently be bought in the market, ready made. They are often used in iron works, too, where they can be readily and cheaply made. They are considered, by some, to be more efficient than brick chimneys of the same proportions, because they do not allow cold air to leap into the flue and chill the heated gases. This action is often perceptible

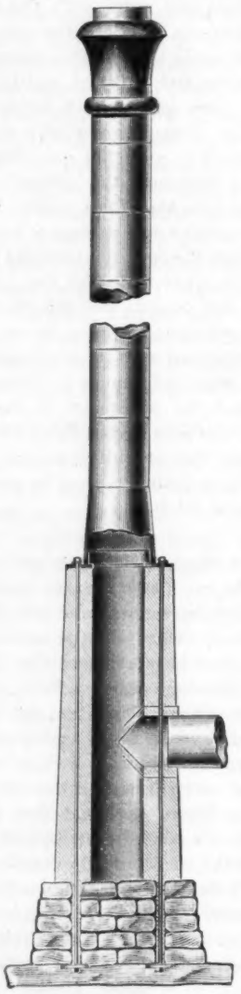


FIG. 1.

in brick chimneys that have stood for some years, but it is doubtful if the advantage of the iron stack in this particular is sufficient to more than counterbalance the increased radiation of heat which takes place from the comparatively thin plates of which the iron stack is composed. The effect of the weather and of the products of combustion on iron stacks is often very marked, and we have known of cases in which holes were corroded through these stacks so rapidly that the entire stack had to be replaced every year. Of course this is an extreme case, but the same action goes on more slowly in many other cases. To lessen the corrosive effects of the weather, iron stacks should be well kept painted. Many recipes for making paints suitable for this purpose have been published, but it will not be necessary to discuss them in the present article as the paints themselves can be bought, ready for use.

Iron stacks are also sometimes lined with brick, to protect them from the action of the hot products of combustion, and and add to their stability. Iron stacks are usually held in

position by four wrought iron guy rods, secured to a ring of angle iron that is riveted to the stack about two-thirds of the way up, and anchored at a distance from the base of the stack about equal to the height of the ring of angle iron to which they are secured above. The sectional area of these guys should be sufficient to withstand the action of the strongest winds that are experienced in the neighborhood of the stack. This should be determined for each locality separately; but engineers often use the following "rule of thumb," which is found by experience to give satisfactory results in most cases: Multiply the height of the stack, in feet, by its diameter in inches, and take the square root of the product. Divide this square root by 100, and the quotient is the least allowable diameter of the guy in inches.

Iron stacks may be designed, however, so that they shall be stable without guys. Such a stack is represented in Fig. 1, and for the convenience of our readers we shall give some account of its details, it being understood that all dimensions are intended to apply to a stack 48 inches in diameter, and 80 feet high. Stacks having proportions different from these should have their details designed accordingly.

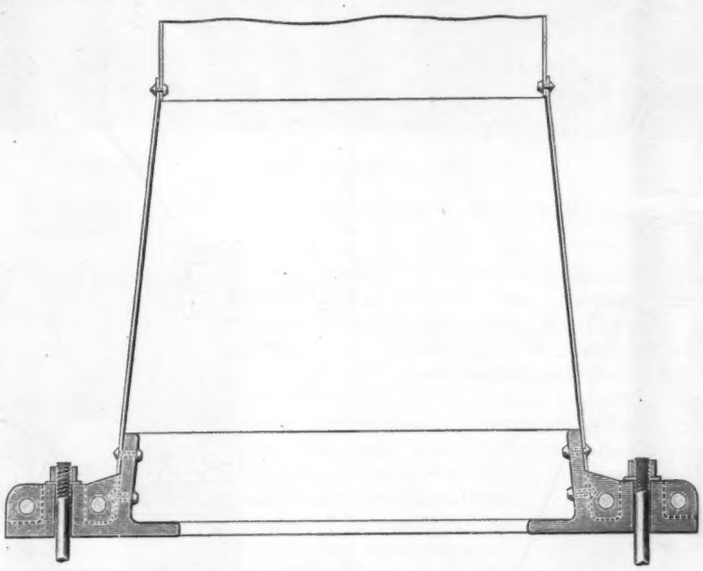


FIG. 2.—SECTIONAL VIEW OF THE BASE PLATE OF FIG. 1.

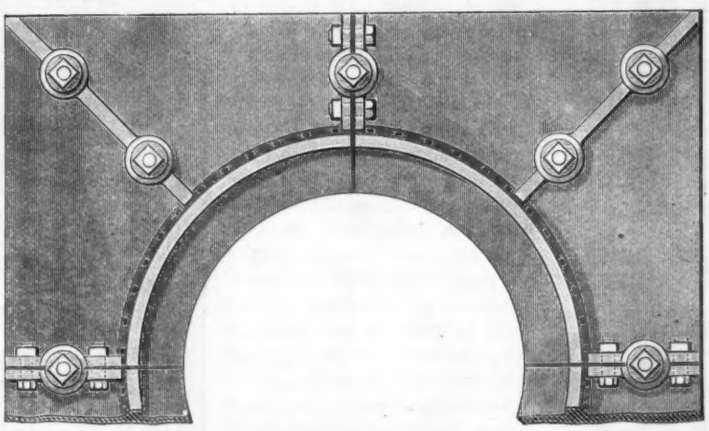


FIG. 3.—PLAN OF THE BASE PLATE OF THE STACK SHOWN IN FIG. 1.

The stack shown in Fig. 1 is composed of wrought-iron plates ½ inch thick at the bottom, and gradually lessening in thickness toward the top, where they are $\frac{3}{16}$ inch thick. It rests upon a square brick stump, or base, which is 20 feet high, and 8 feet square at the top, and 9 feet 4 inches square at the bottom. This gives the outer surface a batter of 1 in 30. The brick base rests upon a suitable stone foundation, and receives the flue from the boilers through a circular arched opening as shown in the cut. On the top of the base rests a cast-iron frame or base-plate, to which the stack is riveted, and which is itself secured to the stone foundation by twelve long 2-inch rods or bolts, two of which are shown in Fig. 1.

The details of the iron base-plate are better seen in Figs. 2 and 3, Fig 2 showing it in section, and Fig. 3 giving a view of it as seen from above. It is made in four parts and is bolted together, when in position, by eight 1½ inch bolts, which pass through ribs cast on the surface of the plate. The long 2-inch anchoring bolts pass through bosses cast along the lines of the ribs, and are secured by suitable nuts and washers. The base-plate is two inches thick, and on its upper surface there is a conical ring twelve inches high, over which the stack fits and to which it is securely fastened by two rows of rivets. A stack such as that here described can be built so that it will be stable in a wind blowing at 70 miles per hour.

Although we believe this stack to be very satisfactory, boiler owners sometimes prefer a cheaper construction, even though it may be less durable. Fig. 4 shows a form of stack that is sometimes used under these conditions. It has no brick stump. It is riveted to a base-plate which is bolted directly to the foundation. The flue from the boilers is flanged outward and riveted to the stack, as shown in the cut. This stack is necessarily weakened by cutting out an opening equal in area to its own cross section, for the entrance of the products of combustion. It must be braced by guys as explained in the first part of the present article.

Iron stacks are also erected somewhat after the plan shown in Fig. 1, but without the long bolts there shown, the requisite stability being secured by guys. The best stacks of this kind have a brick stump high enough to receive the flue from the boilers, and on the top of this stump the iron stack rests. The retaining bolts are omitted, and guys are provided in the manner explained above. This form of stack is cheaper than that shown in Fig. 1, and many prefer it on that account; but it does not look so well.

Stacks should be so designed and constructed that the opening in them comes directly in line with the boiler flue. This is not always possible, and local conditions may render it necessary to make one or more bends in the flue. The straight flue is much to be preferred, however, as it offers less

obstruction to the free flow of gases which is essential to a good draft.

When used with boilers having a breeching front, iron stacks are often riveted directly to the breeching as shown in Fig. 5. When this is done the gases have the freest exit, but care should be taken to have the bolts and other parts of the breeching and boiler front strong enough to sustain the weight of the stack. Stacks that are riveted directly to the breeching pass straight up through the roof of the boiler-house, and it is not unusual, in such cases, to dispense with guys and brace the stack by a sheet-iron sleeve secured to the boiler-house roof, if that be high enough to give the stack sufficient stability.

For temporary use, iron stacks may be secured in a similar manner to the uptake of a flush front or overhanging front

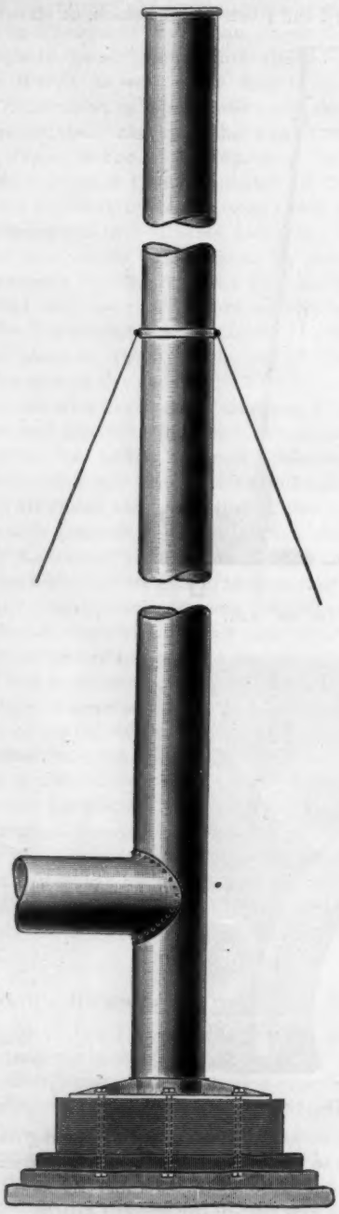


FIG. 4.

boiler as indicated in Fig. 6. We do not recommend this as a permanent arrangement, however. In cases of this kind a sort of conical sheet-iron hood, whose section is rectangular at the bottom and circular at the top, is used to connect the uptake with the stack.—[The Locomotive.

THE American Sheet Mill of Phillipsburg, N. J., employing 70 hands has suspended operations for a few weeks, certain orders which were expected being withheld for the present.

AMONG orders received by A. L. Ide & Son, of Springfield, Ill., during the last ten days are the following: One 100 h. p. Ideal Engine for the Ludington Building, Chicago (second order); one 125 h. p. Ideal engine for the Hoopeston Canning Co., Hoopeston, Ill.; three 175 h. p. Ideal tandem compound engines for the new Stock Exchange Building, Chicago; two 125 h. p. and one 100 Ideal engines for the Southern Hotel, St. Louis. The Stock Exchange and Southern Hotel engines are all to have General Electric Co. miltipolar armatures directly attached to their crank shafts, the Stock Exchange engines driving 100 k. w. machines and the Southern Hotel engines driving 50 k. w. machines. The two 125 h. p. engines drive in addition one each 50-arc light dynamo, belted direct from the governor pulley.

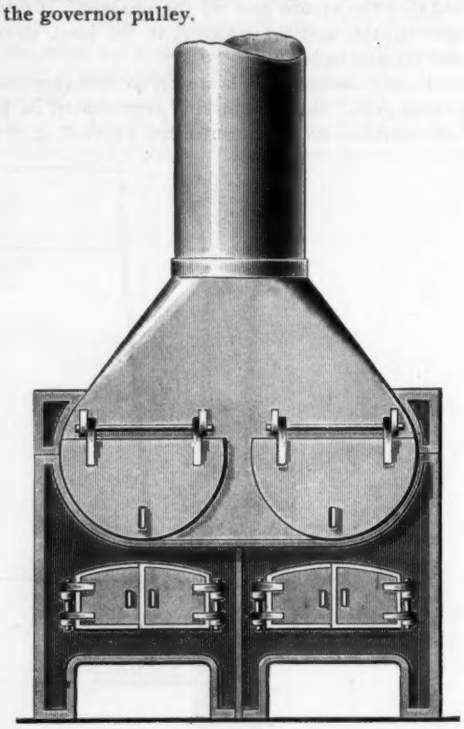


FIG. 5.—ILLUSTRATING THE DIRECT CONNECTION OF STACK AND BREECHING.

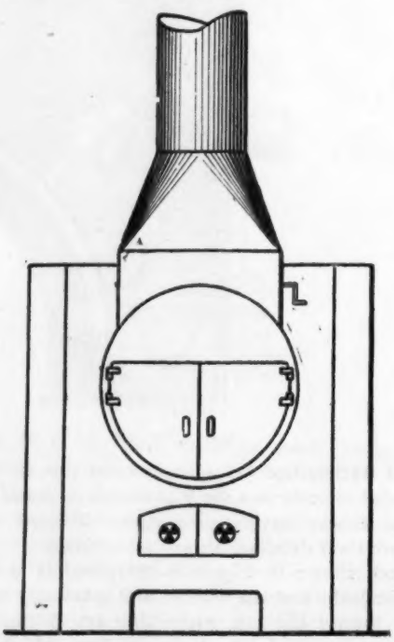
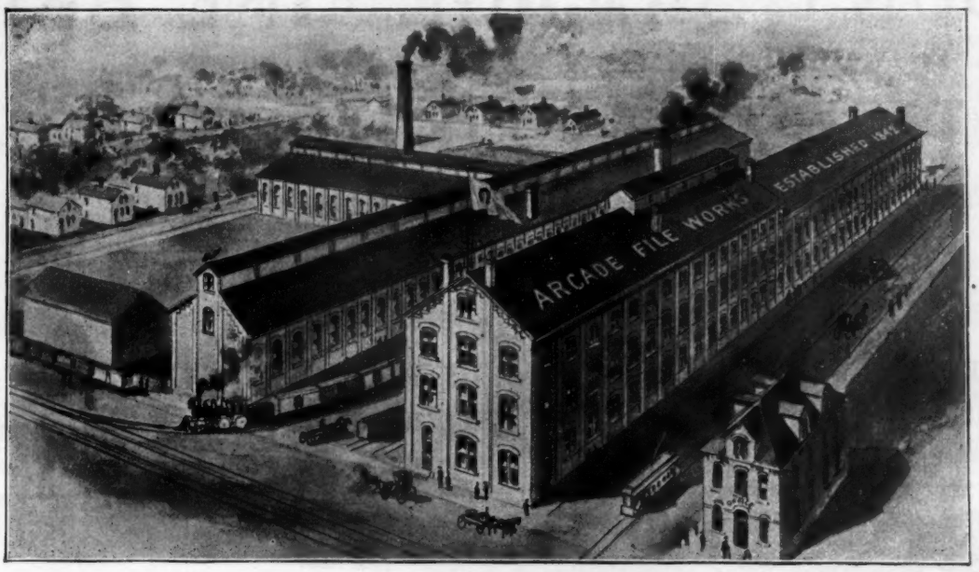


FIG. 6.—DIAGRAM ILLUSTRATING THE DIRECT CONNECTION OF A STACK TO AN OVERHANGING FRONT.

THE Grace Furnace of the Brier Hill Iron & Coal Co., Youngstown, O., has been banked, this being the first time in their history that the company's furnaces have been idle from ack of orders. The Phœnix furnace of the Brown-Bonnell Iron Co. was banked Sept. 30.

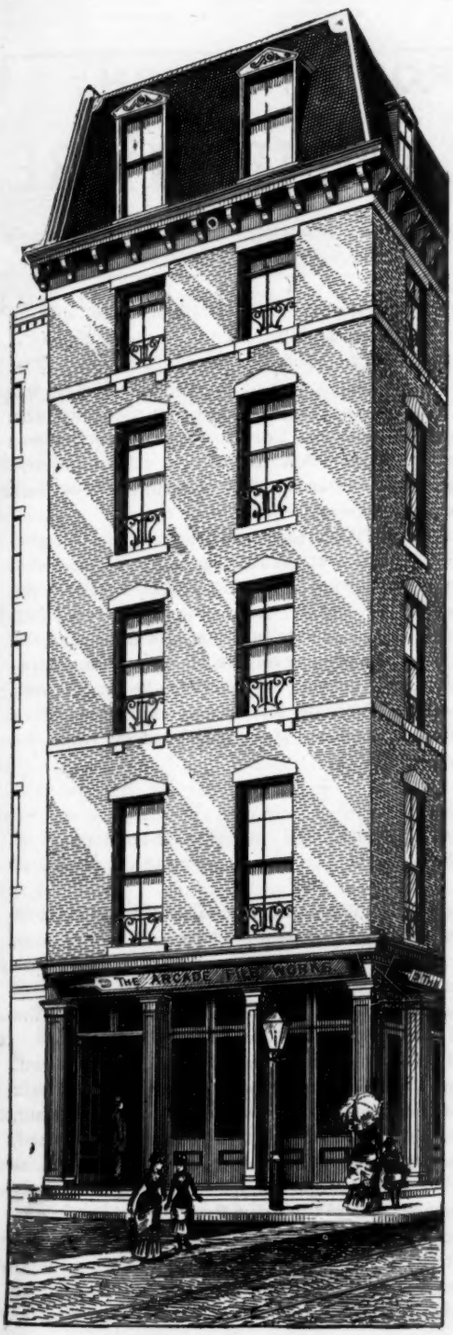
THE Automatic Wind Motor Co. has been incorporated at Albany, N. Y., to manufacture wind motors, pumps, and electrical machinery to be used in connection with motors.



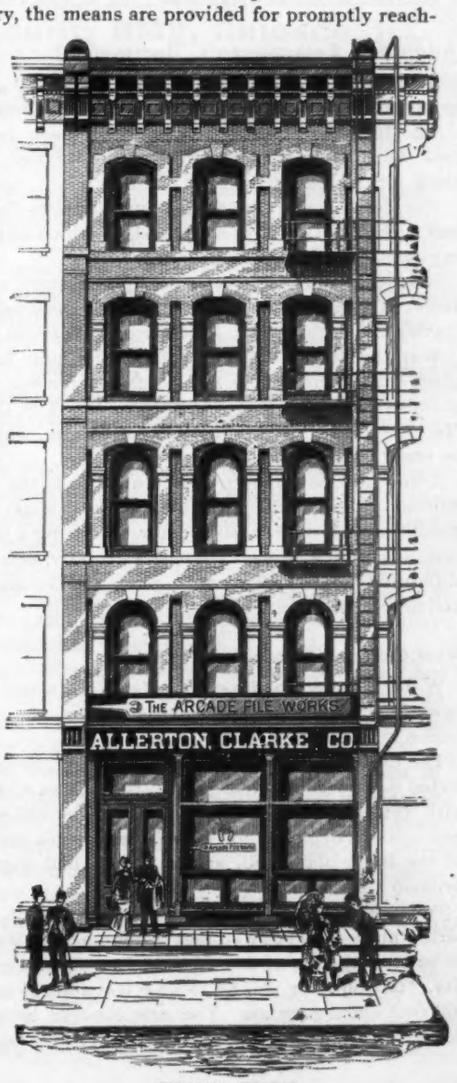
WORKS: ANDERSON, INDIANA.

AN IMPORTANT GAS-BELT INDUSTRY.

The erection of the buildings of the Arcade File Works at the well-known gas-belt town of Anderson, Ind., was part of the industrial development so noteworthy in that region last year. The plant was designed especially for the manufacture of files, and is the most complete of the kind in the country, or in the world. Some idea of their extent may be gained from the accompanying illustration. In the same connection we give cuts of the New York office and warehouse, at 83 Reade st., and of the Chicago store, at 23 Lake st. With these main points thus covered and with the plant close to the population center of the country, the means are provided for promptly reaching the trade. Mr. Alfred Weed, inventor of file machinery, has patented new machines which this company control, and which they alone use. This advantage is in addition to the temper given the Arcade files with the aid of the even heat of the natural gas. The prime claim made by the manufacturers is that the Arcade files are files for practical machinists. The company note that they have been running their machine department with a largely increased force, the demand for their files having been a constantly augmenting one since the building of the Anderson works. The officers of the company are Samuel W. Allerton, president; Alfred Weed, vice president and general manager, and Courtlandt C. Clarke, secretary and treasurer.



NEW YORK STORE.



CHICAGO STORE.

The improvement in the Connellsville coke trade which began to be felt the first week in September has been marked and steady ever since. Since that time the active ovens have increased from 3,311 to 5,397; production has risen from 30,000 to nearly 50,000 tons, and the shipments from 1,604 to 2,939 cars per week. The prospects for further improvement are very good, though the revival will not be so rapid. —[Connellsville Courier.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

GOVERNMENT ✦ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

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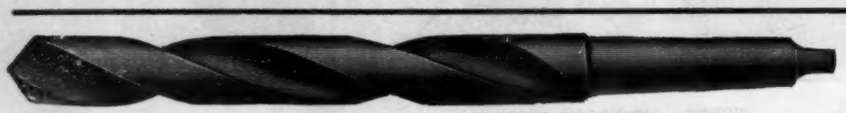
Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Lewis Block, Pittsburgh, Pa.



THE WHITMAN & BARNES MFG. CO.,
Manufacturers of DIAMOND BRAND TWIST DRILLS.

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STORES AND WAREHOUSES AT
Boston, Mass.; New York, N. Y.; Philadelphia, Pa., Cincinnati, O.; Chicago, Ill.; Kansas City, Mo.; San Francisco, Cal.; London, Eng.; Paris, France.

LAKE SHORE IRON WORKS, MARQUETTE, MICH.,

Manufacturers of MINING MACHINERY.

HEAVY ROCK CRUSHERS FOR IRON ORE

A SPECIALTY.

INDUSTRIAL SUMMARY.

Additions, Enlargements, Removals, Etc.:—

The people of New London, Conn., are working to secure the removal to that place of the Bath, Me., Iron Works.

The Iowa Farming Tool Co., Fort Madison, Ia., have added two shops to their plant, with machinery that will increase their fork output 50 per cent.

The Columbian Pump & Machine Works, at Columbiana, O., has purchased two acres of ground, on which additional buildings will be erected in the near future.

Racine, Wis., is to have a new gun factory, which will be removed from Boston. F. Simonsen has been instrumental in closing the negotiations. About 150 hands are to be employed.

Work has begun at Love's Model City, near Buffalo, on the plant of the Empire Mfg. Co., which will remove from Medina, plumbers' supplies being manufactured. The Casey Nailing Machine Co. have a plant in Model City, also, which will soon be ready for operation.

A new mill, 60x150 feet, has been added to the plant of the Ellwood Ivins Tube Co., at Oak Lane, near Philadelphia. Machinery has been installed for producing a high grade of seamless tubing, drawn from steel, copper, brass, aluminum, aluminum bronze, silver, gold, platinum, German silver, and various compositions.

New Construction:—

W. W. Cross & Co., Brockton, Mass., are about to put up a new tack factory, 160x35, on the site of the one recently burned.

The Carbon Steel Company, of Pittsburg, have about completed a modern electric plant. It occupies a brick building with iron roof, 60x30 feet. A 16-inch stroke Ball engine drives four 250-volt dynamos for the electric cranes and screw down of the large plate mill, and a 14-inch Ball engine drives a dynamo for the lights.

James Stewart & Co., engineers, of Buffalo, N. Y., are preparing plans for a large storage warehouse for lake freight, to be built on the site of the old Chicago transfer elevator in that city. The building will be 300x200 feet and 146 feet high, and will cost about $400,000. The new Eastern elevator, on the Buffalo River, opposite Washington street, Buffalo, is nearing completion, 1,100 men being at work upon it. This building will be 165 feet high.

The bridge between Homestead and Braddock, the building of which has been in contemplation by the Carnegie Steel Co. for about two years, will probably be erected next year. The plans for the structure are ready, and have been locked up in a drawer at the Carnegie Company's offices for many months. Since the hot metal route has been made a success between the two works, it is likely that the bridge will be erected. Secretary Lovejoy said yesterday, that it would not be built before next year.—[Pittsburg Dispatch, Oct. 8.

Contractor Ridge, of Pittsburg, who is building the foundations for the steel works at Ashtabula, O., has suspended work, awaiting the completion of the Nickel Plate tracks to the new plant. The Shiffler Bridge Co., of Pittsburg, have notified him that they will not be able to commence delivering the iron for the buildings before the middle of November, and as this will give him plenty of time to complete the foundations, he decided to wait for the side track to be completed rather than to pay teams for hauling stone and material from the main line track.

Fires and Accidents:—

Wm. Stormont's foundry and machine shop burned at Ottawa, Ill., with loss of $15,000, chiefly on patterns, tools and machinery.

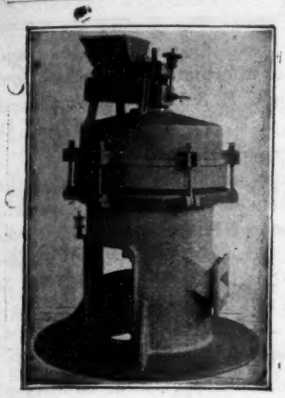
The Alpena Industrial Works, at Alpena, Mich., had a fire in their foundry recently and lost patterns to the value of $7,000, insured for $5,000.

The engine at the Homestead, Pa., electric light plant is a wreck. The casting forming the engine bed broke and the engine smashed itself to pieces. It will be replaced.

A Girard, O., letter of Oct. 7 to the *Ohio Sun*, Youngstown, says: An explosion similar to the one happening about six weeks ago again occurred at the Mattie furnace last evening. The top ring was blown out. Top Filler Keller was burned, but not very seriously. This explosion is not as serious as last time. The bell is still in position, and it is expected they will have the damage repaired in a few days.

General Industrial Notes:—

The Pennsylvania Steel Co. re-elected its old board of directors, and added another member, Effingham B. Morris,



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Ball Pulverizer and Rock Breaker

on new and advanced principles, almost entirely ELIMINATING FRICTION in applying power and REDUCING WEAR AND TEAR to a fraction of that of other machines for same class of work. Will produce finished product, either wet or dry, to any degree of fineness. Requires less power and costs less than any other machine of same capacity, and has no equal in the market.

Effective. Compact. Durable.

One machine, costing $1,000, using 8 H. P., will pulverize 24 tons per day to 40 mesh and finer and a corresponding quantity to any degree of fineness. For full particulars and prices, call on or address

THE AMERICAN MINING & MILLING MACHINERY CO.,

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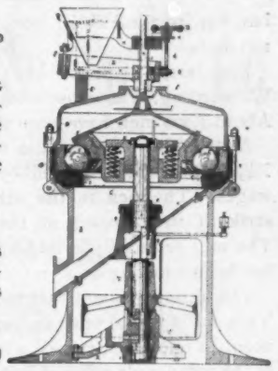
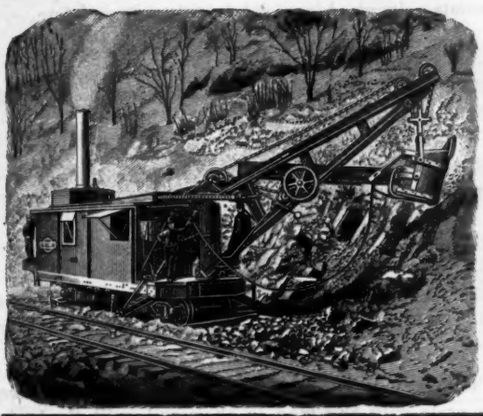


Bucyrus Steam Shovel & Dredge Co.,



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STEAM DREDGES — Of All Types and Sizes; for All Purposes; Elevator, Dipper, Clam Shell, Suction. Special Machines for Special Work.

WRECKING CARS — BOTH HAND AND STEAM. CAPACITIES 10 TO 35 TONS.

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FIRE BRICK, FIRE CLAY,

For Blast Furnaces, Cupola Lining, Boiler Setting, Smoke Stack Lining, or Any Other Purpose.

EVERY CLASS OF SPECIAL SHAPES AND SIZES.

ALL KINDS OF

Foundry Supplies.

FACINGS, BLACKINGS AND MOULDING SANDS

Of All Kinds.

president of the Girard Trust Co., one of the Steel Co. receivers.

Gibson Iron Works, of Gibson City, Ill., have been incorporated with $50,000 capital.

The Susquehanna Rolling Mill, of Columbia, Pa., resumed work after a stoppage of some weeks.

It is reported that the Neshannock and Raney and Berger furnaces, of New Castle, Pa., will resume Oct. 15.

The works of the Buckeye Engine Co. at Salem, O., are running on half time on account of poor business.

The rolling mill of the United States Car Co. at Anniston, Ala., which closed down for lack of ore, has resumed.

The first roll for the new beam mill at Homestead has been cast, and hereafter the company will make all its rolls.

At Louisville, Ky., Theun and Powell, machinists and foundrymen, made an assignment. Assets $36,484.29. Liabilities $31,401.49.

The Chattanoogo (Tenn.) Foundry and Pipe Works has secured an order from St. Louis for 6,000 tons of pipe, valued at over $100,000.

Liabilities of $150,000 and quick assets of only $50,000, caused the Swampscott Machine Co., of Boston, to pass into receivers' hands.

The Athens Tenn. Foundry and Machine Shops are running with a full force and have so many orders that additional help has been employed.

The H. C. Frick Coke Co. is reaching out for foreign trade. Arrangements are being made to send hundreds of cars of coke to Philadelphia for export.

The puddlers employed by the Duncannou (Pa.) Iron Company have gone to work on a 35 cents per ton reduction, bringing puddling down to $3.15 a ton.

The Crozer furnaces at Roanoke, Va., are in blast. The Duvall Engine Works, also of Roanoke, are working full time and the Roanoke Machine Works are running double time.

The Standard Iron Co.'s foundry at Superior, Wis., is running full time, with a large force of men. The company lately put in additional machinery for making corrugated mill rolls.

The Salem Wire Nail Company, operating mills at Findlay and Salem, O., will run non-union. After a three-months' fight the Findlay men agreed to work non-union and accept a 10 per cent. cut.

The Laughlin Nail Co. announce through their Chicago office, 551-53 Rookery that their mills resumed in all departments Oct. 2 and that they are now ready to execute all orders from Bessemer steel to cut nails.

The Homestead Steel Works are running this week, according to this schedule: Armor plate, open-hearth coverting mill, 28-inch plate mill, and the 10-inch mills, double turn; 23, 32, 35 and 40-inch mills, single turn.

Sharon Furnace, at Sharpsville, which has been banked for several weeks, will again go into operation today. It is operated by Hall & Co., but is leased by P. L. Kimberly & Co., who will use its product in their mills.

The Woodward Iron Company of Woodward, Ala., blew in one of their furnaces Oct. 10, when certain of their mines also resumed operations. One of the furnaces has recently been relined and the other is now undergoing relining.

The Buckeye Engine Co., of Salem, O., has recently furnished to Bagnall & Hilles, of Manila, Phillippine Islands, 6,200 horse-power, high-speed, compound condensing engines, with cylinders 13 and 22½ inches in diameter by 18-inch stroke.

J. J. Hudson, of Philadelphia, has bought at sheriff's sale the real estate of the Crum Creek Iron & Steel Co., and the equipment of the works at Crum Lynne, Pa., for $1,050 subject to a mortgage of $16,000. The product of the plant was muck

bar, bar iron and skelp iron, the annual capacity being 5,000 net tons.

The large plant of the Westinghouse Air-Brake Co. at Wilmerding, Pa., closed down last week for three weeks. About 1,000 men have been thrown idle.

A strike is on among the tonnage men at the Springfield, Ill., Rolling Mill, caused by a reduction of 10 per cent. in wages. The men in the other departments also threaten to strike if the demands of the tonnage men are not acceded to. The mill ordinarily employs 400 or 500 men, but for some time hss been running on short time with a greatly reduced force.

The announcement that more of the departments at the Bay View mills would open up yesterday morning and give employment to 1,500 men caused a large gathering of the unemployed at the company's office at Bay View. Tickets of admission to the works had been issued to the old hands who had been ordered to report for duty, and they arrived at the gates at 4 o'clock. As had been anticipated there were about 800 others there to ask for work, some of their appeals being pitiful to hear. Manager Hinton and Supt. Otjen found it a very trying experience to have to deny the appeals and were glad when it was all over. The crowd kept increasing until at 6 o'clock fully 2,000 men were on the ground.—[Milwaukee Sentinel, Oct. 3.

The Columbia Iron & Steel Co.'s works at Uniontown, Pa., have been levied up to satisfy a judgment for $110,076 held by Robert Hogsett, president of the company. Two years ago the company obtained an extension from creditors running over several years, but could not meet the first payment in full, about a year ago. The indebtedness of the firm is $578,538. The company was incorporated in 1885 with a paid-in capital of $400,000 and values its plant at $900,000. A considerable portion of the product, steel beams for structural work, was sold in New York, and the Indiana Iron Co., Muncie, Ind., announce that they will run their mill non-union. Their workmen are expecting the importation of negroes. The company have built a high board fence about their works. Their offer to the men was $4 pudding and a cut of 25 per cent. on the finishing.

To or From Chicago via the Lakes.

If going to Chicago and not pressed for time, take the greatest trip to the greatest fair on earth having a one-thousand-mile ride on the grandest palace steamers on the lakes, returning from Chicago all rail. If preferred, can go to Chicago all rail and return via the lakes and Detroit. Berths and meals included between Mackinac and Chicago. This trip will give very pleasing, picturesque scenery, and a refreshing, restful change. A very enjoyable trip for all to take, and will well repay doing so. Round trip rate from Cincinnati $21.30, via Toledo and boat 30 cents less. For further information as to rates from other points ask any agent on the C. H. & D. system, or address E. O. McCormick, G. P. & T. A., C. H. & D.R. R., Cincinnati, O.

A special excursion to Chicago, under the auspices of the Cleveland City Guards, via Valley and B. & O. Railways, will leave Valley Railway Depot, foot of South Water St., Cleveland, at 8:30 P. M., Monday, Oct. 16th. For tickets and full information call at office of Bell, Cartright & Co., E. R. Hull & Dutton, Larwood & Day, or No. 18 Chestnut St.

The Wonders of the World's Fair

Should be seen by every citizen of this glorious country of ours. The Nickel Plate Road's one fare excursion, Oct. 12th, will be your opportunity. Don't miss it.

The Cincinnati Corrugating Co. at Piqua, O., are in full operation on a large variety of orders for steel and iron roofing, Juniata galvanized iron and American terne plate.

Only Three Weeks More,

And the World's Fair will be over. Get ready and take Nickel Plate Road's one fare excursion, Oct. 12th.

The Southern Malleable Iron Works, of Chattanooga, Tenn., have 150 men at work at present and running double heats every day, a thing never before done by this concern.

You Might Walk,

But it will be cheaper to take the Nickel Plate Road's one fare excursion to the World's Fair, Oct. 12th. No extra charge for fast time.

The Mahoning Valley Iron Co., of Youngstown, have agreed on a scale with the men in their nail mill, the basis being 14 cents instead of 15 as last year.

If You Wish to Travel Cheaply,

Take Nickel Plate Road's one fare excursion to Chicago, Oct. 12th. Three trains each way every day.

Fire in the foundry and machine shops of Geo. Simon, at New Iberia, La., caused a loss of $25,000; insurance, $11,400.

One Fare, Oct. 12th,

To Chicago and return, via popular Nickel Plate Road. Superb new dining cars.

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24″x10′Empire Lathe, compuond rest.
10″x4′ Sebastian May lathe, screw cutting.
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No. 1 Browne & Sharpe universal milling machine.
60″ Niles pulley boring machine.
36″ Stevens pulley lathe, 2 tools.
60″ Radial drill.
No. 1 Wire feed screw machine.
No. 1 Hand miller.
11″ Enterprise shaper.
24″x6′ planer, all feeds in head.
36″x36″x10′ Pease planer complete.
Power bending rolls 8′x10″.
Heavy punch, shear and flanging clamps.
1 1-2″ Pratt & Whitney bolt cutter.
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We press, cut, stamp and draw all kinds of sheet metal into all kinds of shapes, and make all kinds of

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Send us a sample or drawing of what you want stamped or blanked, or what you want to stamp or blank, and we will quote you prices on the article, or on the machinery to make it.

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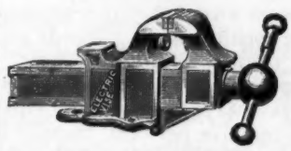

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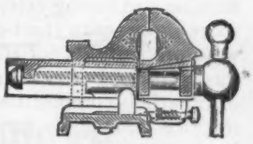
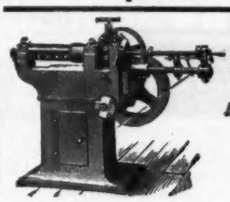
IT HAS QUALITIES THAT ARE UNDISPUTED.
Rapid, Active, Prompt.
One movement in and out, one turn of the hand and the work is secured.



The Capital Machine Tool Co, AUBURN, N. Y.



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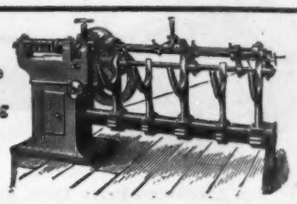
Builders of Machinery for Hardware Manufacture.
Automatic Wire Straightening and Cutting Machines, Butt Milling Machinery, Butt Drilling Machinery, Riveting Machines, Foot Presses, Sprue Cutters, Etc.



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Made by the Philadelphia Emery & Corundum Wheel Co.

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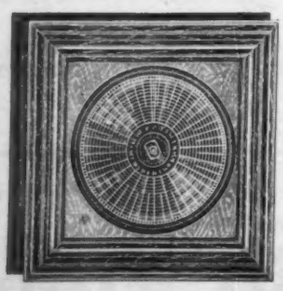
The Pneumatic Watchman Check.



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No Expense Maintaining It.
No Possibility of Watchmen Beating It.
No Chance for It to Get Out of Order.

Better and Cheaper than any other reliable device on the market,

A perfect time recorder for use wherever watchmen are employed. Records at any desired point from distant stations. Indorsed by underwriters and insurance premiums reduced by its use. Fully protected by letters patent in America and Great Britain. Correspondence solicited.

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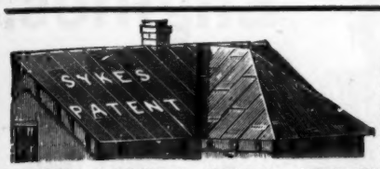
Our method of painting and applying our roofing makes it absolutely wind, water and lightning proof,

Before Placing Contracts write us for Estimate. When writing for Estimates Mention Price-List "7."



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Corrugated Iron, Beaded Iron Siding and Ceiling, Galvanized Steel Eave Trough, Conductor Pipe, Etc.

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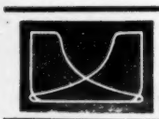

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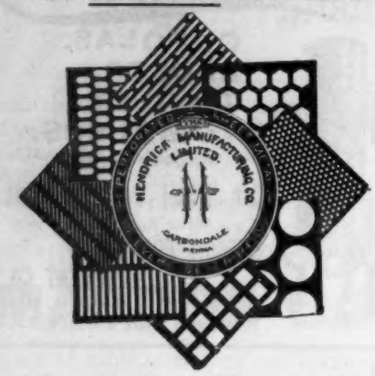

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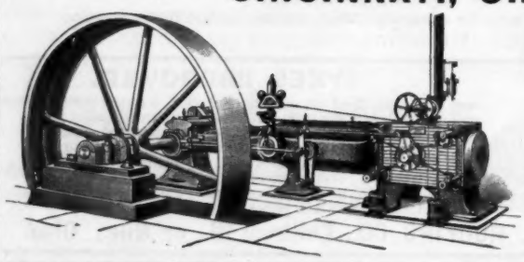

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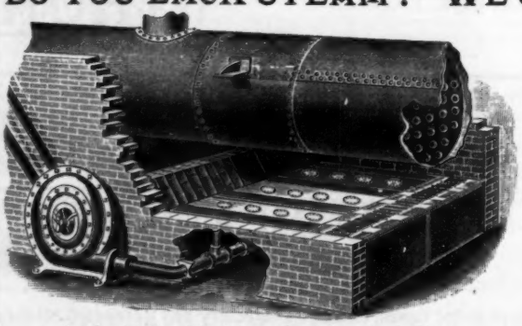

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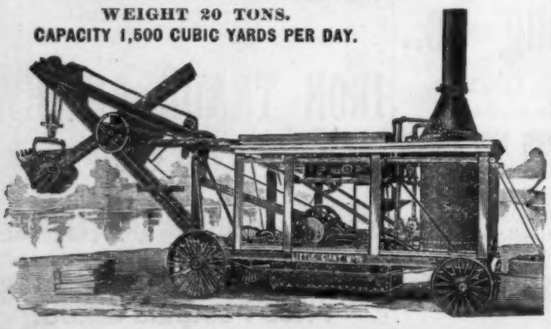

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Wm. Jessop & Sons, Ltd., New York, N. Y.

Steel Color Paint—
W W. Lawrence & Co., Pittsburgh, Pa.

Steel Castings—
Chester Steel Casting Co., Philadelphia, Pa.
Wm. Jessop & Sons, Ltd., New York, N. Y.

Scrap Iron & Steel—
Klein & Cohn, Cincinnati, O.

Stokers—
Brightman Stoker Co., Cleveland, O.

Special Machinery—
Toledo Machine & Tool Co., Toledo, O.
Godfrey J. Bremer, Kalamazoo, Mich.
Cleveland Stamping & Tool Co., Cleveland, O.
Richard O. Jones, Cuyahoga bldg., Cleveland, O.

Steel, Mushet's—
B. M. Jones & Co., Boston and New York.

Smoke Consumer—
Brightman Stoker Co., Cleveland, O.

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.

Stay Bolt Iron—Taylor's—
B. M. Jones & Co., Boston and New York.

Screens for Coal, Ore Etc—
Hendrick Mfg. Co Ltd., Carbondale, Pa.

Schools—
Correspondence School of Mechanics, Scranton, Pa.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.

Tanks—
Ravenna Boiler Works, Ravenna, O.

Time Detectors—
The Pneumatica Watchman Check Co., Columbus, O.

Tin Plates (Roofing)—
Merchant & Co., Philadelphia, Pa.

Tinners' Hardware—
Berger Bros, Philadelphia, Pa.

Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.

Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.

Tramways—
Trenton Iron Co., Trenton, N. J.

Trucks—
The Spicer Mfg. Co., New Philadelphia, O.
Detroit Foundry Equipment Co., Detroit, Mich.

Watchman Time Detectors—
The Pneumatic Waschman Check Co., Columbus, O.

Wheelbarrows—
Akron Tool Co., Akron, O.
Kilbourne & Jacobs Mfg. Co., Columbus, O.

Wire Belting—
H. N. Green, 1219 Filbert St., Phila., Pa.

Wire Rope—
Trenton Iron Co., Trenton, N. J.

Tumblers—
Detroit Foundry Equipment Co., Detroit, Mich.

Turret Drills—
A. P. Quint, Hartford, Conn.

Twist Drills—
Cleveland Twist Drill Co., Cleveland.
The Whitman & Barnes Mfg. Co., Akron, O.

Ventilating Fans—
E. H. Jones & Co., Cleveland.
Brightman Stoker Co., Cleveland, O.
B. F. Sturtevant Co., Boston, Mass.

Vises—
Capital Machine Tool Co., Auburn, N. Y.

Well Drilling Machinery—
Williams Bros., Ithaca, N. Y.

Wood-Working Machinery—
J. A. Fay & Egan Co., Cincinnati, O.

Wire Machinery—
John Adt & Son, New Haven, Conn.

Washers—
Milton Mfg. Co., Milton, Pa.

Water, Gas and Steam Pipe—
Addyston Pipe & Steel Co., Cincinnati, O.
Radford Pipe & Foundry Co., Cincinnati O.

Manufacturers

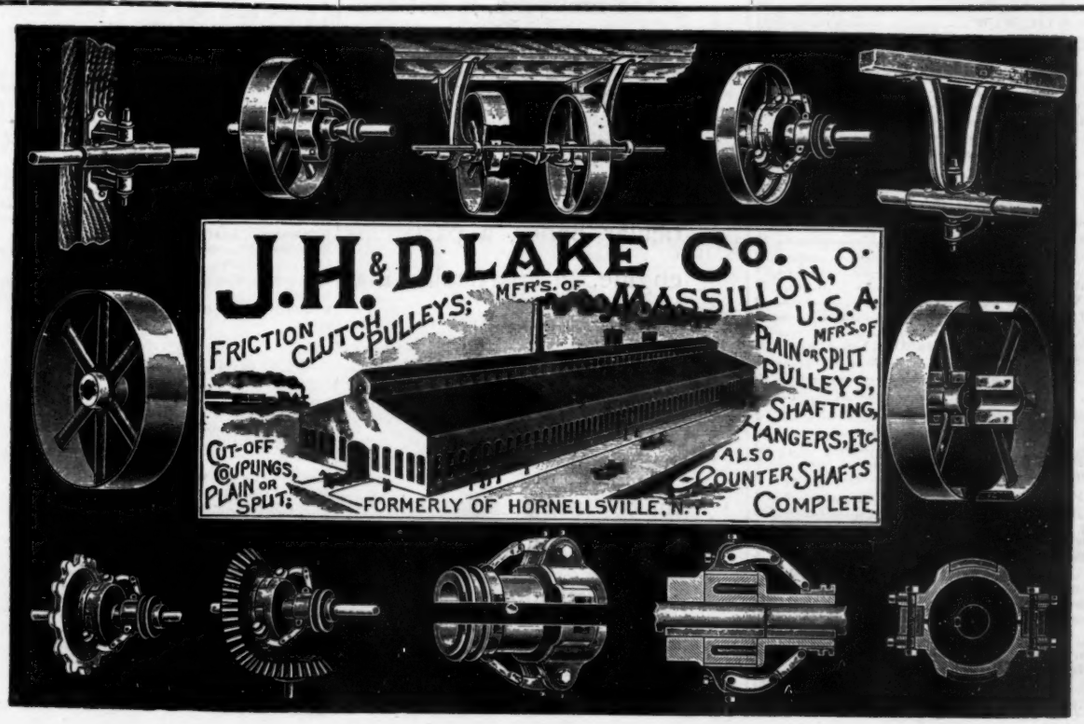
Are most cordially solicited to investigate the merits of the country reached by the Baltimore & Ohio Railroad. We sincerely believe we can demonstrate that the natural advantages, which exist along this system of railroad, cannot be obtained as a whole on any other transportation line in the world. Goods cheaply made are half is a truism, and we venture the assertion that a greater variety of factories can be operated along the Baltimore & Ohio, and at less cost for production, than any other section of the United States. We are ready to assist Manufacturers in reaping the benefits of these advantages. Correspondence solicited.

M. V. RICHARDS,
Land and Immigration Agent, B. & O. R. R.,
Baltimore, Md

ALONG THE BALTIMORE & OHIO RAILROAD.

The Advertiser who sticks to printer's ink in dull months will find trade sticking to him when the turn comes.

UNION
ELECTROTYPE
FOUNDRY
TELEPHONE 2129
829 SHERIFF ST. CLEVELAND O


J.H. & D. LAKE CO.
MFR'S OF
MASSILLON, O. U.S.A.
FRICTION CLUTCH PULLEYS;
MFR'S OF PLAIN OR SPLIT PULLEYS, SHAFTING, HANGERS, ETC.
ALSO COUNTER SHAFTS COMPLETE.
CUT-OFF COUPLINGS, PLAIN OR SPLIT.
FORMERLY OF HORNELLSVILLE, N.Y.

Alphabetical List of Advertisers.

The star (*) indicates that the adv. appears alternate weeks: the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

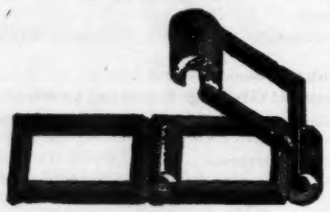
	PAGE
*Acme Safety Emery Wheel Co	21
Adt, John & Son	19
Aitchison, Rob't Perforated Metal Co	20
Akron Tool Co., The	31
American Injector Co	2
Arcade File Works, The	1
Artificial Gas Engineering Co	2
Babcock & Wilcox Co	32
Berger Bros	19
*Berger Mfg. Co	21
Bickford Drill & Tool Co	2
Biedler, Frank R	20-29
Bradley Fertilizer Co	29
Brightman Stoker Co	17
*Brownell & Co., The	—
Bucyrus Steam Shovel & Dredge Co	18
Chester Steel Casting Co	31
*Cincinnati Milling Machine Co	—
Cleveland & Buffalo Transit Co	31
Cleveland City Forge & Iron Co	1
*Cleveland Desk Co	31
Cleveland Iron Mining Co	18
Cleveland Rolling Mill Co	23
Cleveland Stamping & Tool Co	19
Cleveland Twist Drill Co	32
Cole, J. Wendell	32
Condit-Fuller Co	19
*Copeland & Bacon	29
Correspondence School of Mechanics	21
Corrigan, Ives & Co	18
*Curtis Steel Roofing Co	21
Capital Machine Tool Co., The	19
Deming Co	31
Detroit Foundry Equipment Co	21
Dixon, Jos. Crucible Co	23
Downerd & Son Co., The J	31
*Eagle Lubricator Co	—
Eclipse Electrotype & Engraving Co	32
Eller & Co., J. H	21
Fay & Egan Co., J. A	27
Fleharty, J. H. & Co	30
*Foos Mfg. Co	—
Fulton Steam Boiler Works & Foundry	27
Garden City Sand Co	17
Gerlach, Peter & Co	22
Gordon Hollow Blast Grate Co	22
Graves Elevator Co	20
Green, H. N	20
Haldeman & Co., N. A	21
Harrington & King Perforating Co	30
Hartford Steam Boiler Insp. & Ins. Co	31
Haven Co., The James L	32
*Hendrick Mfg. Co., Ltd	22
Hercules Powder Co	28
†Higley Sawing & Drilling Machine Co	27
Hill, Clarke Co	28
*Hodell, H. H. & Co	—
Hunt & Co., Robert W	2
Iron Clad Paint Co	29
Jeffrey Mfg. Co	26
Jenks, James	32
Jessop & Sons, Ltd., Wm	22
Jones & Co., B. M	2
Jones, E. H. & Co	32
Jones, Richard O	20
Kilbourne & Jacobs Mfg. Co., The	2
Lake Co., J. H. & D	25
*Lake Shore Iron Works	16
Lane & Bodley Co., The	22
Lawrence & Co., W. W	23
Lloyd Booth Co	30
Lord, G. W	21
Magnolia Anti-Friction Metal Co	1
McCormick Co., The J. S	1
*Merchant & Co	—
Milton Mfg. Co	32
Murdock, Jr., Jas	30
National Photo-Engraving Co	23
Obermayer Co., The S	1
Oglebay, Norton & Co	18
Otto Gas Engine Co	30
Outhwaite, J. H. & Co	18
Parker, Richard A	20
Penberthy Injector Co	19
Pemberton, Geo	32
*Pneumatic Watchman Check Co	20
Pollock, Wm. B. & Co	2
Pool, F. J. & H. R	1
Pope, E. C	19
Porter Iron Roofing & Corrugating Co	21
Prentiss & Slocum	1
Prentiss Tool & Supply Co	19
Quint, A. P	32
Rainey, W. J	2
Ravenna Boiler Works	32
Richards, M. V	25
Roberts Foundry Co., F. E	2
Robinson & Orr	2
‖Sharon Fire Brick Works	1
Skinner Engine Co	22
Spence & Son, I	2
*Spicer Mfg. Co., The	—
Stilwell & Bierce Co	2
Stirling Co	31
‖Stowe Fuller & Co	1
Sturtevant B. F. Co	27
Sykes Iron Roofing Co	21
Taylor & Boggis Foundry Co	1
Tod, Wm. & Co	30
Toledo Machine & Tool Co	31
*Trenton Iron Co	29
Union Electrotype Foundry	25
Union Mining Co	17
Upson Nut Co	30
Van Duzen Gas Engine Co	2
Vulcan Iron Works	22
Weber Gas & Gasoline Engine Co	1
Wells Engine Co	23
Weston Engine Co	1
Whitman & Barnes Mfg. Co	16
*Wilhelm & Co	—
*Williams Bros	32
Worthington, Henry R	18

JEFFREY

Chain Belting

—ALSO—

MALLEABLE, STEEL, WROUGHT AND SPECIAL CHAINS.



FOR

ELEVATING AND CONVEYING MACHINERY

Send for 1893 catalogue and

REDUCED PRICE LIST.

THE JEFFREY MFG CO.,

143 E. First Ave., Columbus, O.

New York Branch, 163 Washington St.

PERSISTENCE

is a foremost element of success in advertising. Because the reader of an advertisement is not in a humor to buy when he sees it the first time, is not conclusive of the value of that advertisement in his case. Constant familiarity with the announcement of a particular boiler, a particular engine, a particular machine tool, brings the maker to mind when the time does come for making contracts. The men who make freest acknowledgment of their obligation to advertising are the ones who have

Kept Everlastingly at It.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Low Phosphorus Bessemer	$4.15@$0.00
No. 1 Specular, Bessemer	4.50@ 0.00
No. 1 Bessemer hematite	3.50@ 3.75
Hematites No. 1 non-Bessemer	2.75@ 3.25
No 1. Specular, non-Bessemer	3.00@ 3.50

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$12 00@ 00 00
No. 1 Strong Foundry	12 50@ 13 00
No. 2 Strong Foundry	11 50@ 12 50
No. 1 Grey Forge, red short	11 50@ 12 75
No. 2 Gray Forge, neutral	11 25@ 11 50
No. 1 American Scotch	13 50@ 00 00
No. 2 American Scotch	12 50@ 00 00
Lake Superior Charcoal	15 00
PITTSBURGH (reported by A. H. Childs):	
No. 1 Foundry	$12 50@$13 00
No. 2 Foundry	11 50@ 12 00
Grey Forge	11 00@ 11 50
White and Mottled	10 75@ 00 00
Warm Blast Charcoal	18 00@ 21 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	11 75@ 12 50
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$16 00@$16 50
Local Coke Foundry No. 1	13 50@ 14 00
Local Coke Foundry No. 2	13 00@ 13 25
Local Coke Foundry No. 3	12 75@ 13 00
Local Scotch Foundry No. 1	14 00@ 14 50
Local Scotch Foundry No. 2	13 50@ 14 00
Local Scotch Foundry No. 3	13 00@ 13 50
Southern Coke No. 1	14 10@ 14 35
Southern Coke No. 2	12 35@ 12 60
Southern Coke No. 3	11 85@ 12 10
Southern No. 1 Soft	12 35@ 12 60
Southern No. 2 Soft	11 85@ 12 10
Southern Silveries No. 1	14 50
Southern Silveries No. 2	13 50
Ohio Silveries No. 1	16 50@ 17 00
Ohio Silveries No. 2	16 25@ 16 75
Ohio Strong Softeners No. 1	15 50@ 16 00
Ohio Strong Softeners No. 2	15 50@ 16 00
Tennessee Charcoal	16 00@ 16 50
Alabama Car Wheel	00 00@ 18 85
CINCINNATI (reported by Rogers, Brown & Co.):	
Southern Coke No. 1, Foundry	$12 75@$13 00
Southern Coke No. 2 and No 1 Soft	11 00@ 11 25
Hanging Rock Coke, No 1	14 50@ 15 00
Hanging Rock Charcoal No. 1, Fdy	18 50@ 19 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	15 50@ 16 00
Southern Coke, Grey Forge	10 00@ 10 25
" " Mottled	9 75@ 10 00
Standard Alabama Car Wheel	17 50@ 18 00
Tennessee " "	16 00@ 16 50
Lake Superior " "	17 00@ 17 50
BUFFALO (reported by Rogers, Brown & Co.)	
Mahoning and Shenango Valley, strong, No. 1 Foundry	$13 75
Mahoning and Shenango Valley, strong, No. 2 Foundry	13 25
Ohio Softener No. 1	14 00
Ohio Softener No. 2	13 00
Jackson Co. Silvery, No. 1	$16 50@ 17 30
Jackson Co. Silvery No. 2	15 00@ 16 00
Lake Superior Charcoal	16 00
Tennessee Charcoal	16 00
Southern Softener No. 1	13 15
Alabama Car Wheel	18 00
Hanging Rock Charcoal	20 50
LOUISVILLE (reported by Geo. H. Hull & Co.)	
Southern Coke No. 1 Foundry	$12 50@$13 00
Southern Coke No. 2 Foundry	11 25@ 11 75
Southern Coke No. 3 Foundry	10 75@ 11 00
Grey Forge	10 25@ 10 75
Spathite	12 00@ 12 50
Southern Charcoal No. 1 Foundry	15 00@ 16 00
Car Wheel	17 50@ 17 75
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$13 25@$13 50
Southern Coke No. 2	11 75@ 12 00
Southern Coke No. 3	11 25@ 11 50
Southern Grey Forge	10 50@ 11 00
Southern Charcoal No. 1	15 50@ 16 00
Missouri Charcoal No. 1	14 00@ 14 50
Ohio Softeners	16 50@ 17 00
Lake Superior	17 50@ 18 00
Southern	17 50@ 18 00
Connellsville Coke, St. Louis	5 00

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

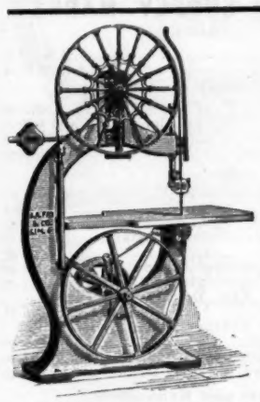
	GROSS TONS
Old iron rails	$18 00
Old steel rails	13 50
	NET TONS
No. 1 R. R. wrought scrap	$12 00
No. 1 wrought scrap	12 00
No. 1 Machine cast scrap	10 00
Iron axles	17 00
Axle turnings	11 00
Wrought turnings (free from cast)	9 00
Cast borings	6 50
Uncut wrought iron boilers	5 00
Steel boiler Plates	10 00
Grate bars	5 00
Pipes and flues (clean)	9 00
Tank iron	8 00
Hoop and band iron	7 00
Sheet iron	7 00
Wrought drillings	7 00
Malleable iron	8 50

WM. B. WILLIAMS, PREST. O. F. BROWNING, TREAS.

THE
HIGLEY SAWING & DRILLING MACHINE CO.,

RAIL AND BEAM COLD SAW. 18" DIAMETER.

MAKERS OF
Hand and Power
Rail and Metal
Sawing Machinery.
129 Worth Street,
NEW YORK, N. Y.



BAND SAWS—TWELVE STYLES.

J. A. FAY & EGAN CO.,
251 to 271 W. Front St., CINCINNATI, OHIO.

OWNERS AND OPERATORS OF
J. A. FAY & CO. THE EGAN CO.
1835 ESTABLISHED 1873

Originators and Constructors of
WOOD-WORKING MACHINERY.

MEDALS FOR SUPERIORITY OVER ALL COMPETITORS.

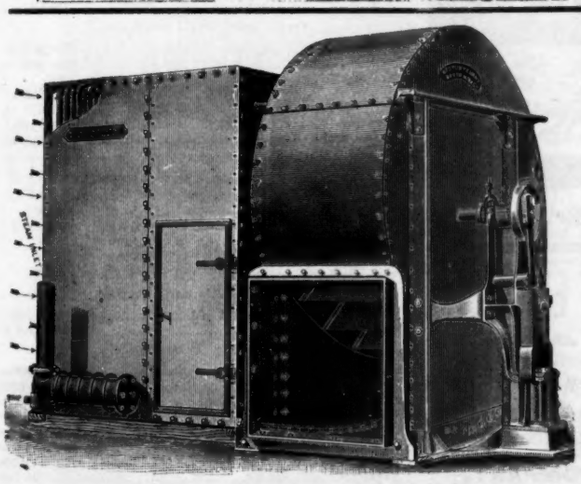
350 awarded us by the various expositions in this country and abroad.

"GRAND PRIX" by the Universal Exposition, Paris, 1889.

Decoration of the "Legion of Honor" conferred by the French Government.

HAND PLANERS 20 SIZES AND KINDS.

BEING IN THE BOILER BUSINESS.
MAKING STATIONARY TUBULAR BOILERS EXCLUSIVELY.
WE CAN MAKE A BETTER BOILER AND ALTHOUGH WE MAKE THEM OF
FLANGE STEEL WITH WELDLESS BRACES AND ECLIPSE MANHOLES
SELL THEM FOR LESS MONEY THAN OLD STYLE ONES.
WE FURNISH NEATER LITHOGRAPHS AND DETAIL ILLUSTRATIONS OF THIS CLASS OF BOILER THAN ANY FIRM IN THE UNITED STATES
FULTON STEAM BOILER WORKS AND FOUNDRY. RICHMOND, IND.



THE
STURTEVANT SYSTEM
OF
Heating
AND
Ventilating
BUILDINGS

Of all kinds by a forced circulation of warm air.
Send for illustrated treatise on ventilation and heating. (3)

B. F. STURTEVANT CO.,
34 Oliver St., Boston, Mass.
91 Libetry St., - NEW YORK
16 S. Canal St., - CHICAGO
135 N. Third St., - PHILA

E. H. JONES & CO., Special Agents, 54 Frankfort St., Cleveland, O.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.60c@1.70c
Angles	1.50c@1.60c
Tees	1.80c@1.90c
Universal Plates	1.60c
Sheared Plates	1.70c

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 65
4¼ to 6 by ⅜ to 1 inch	1 70
1¾ to 6 by 1⅛ to 2 inch	1 85
1¼ & 1⅜ by ⅜ to ¾ inch	1 70
1 & 1⅛ by ⅜ to ¾ inch	1 75
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 85

Round and Square.

1 to 1⅞ inch	1 65
2 to 2⅝ inch	1 75
2¾ to 3¼ inch	1 90
3⅜ to 4 inch	2 15
4¼ to 4½ inch	2 75
4¾ to 5 inch	3 00

Oval.

⅜ to 1¼ inch	1 85
½ to ¾ inch	1 85
½	2 05
⅜	2 25

Half Oval and Half Round.

1½ to 3 inch	2 20
⅜ to 1½ inch	2 00
½ to ¾ inch	2 25
½	2 40
⅜	3 50

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 75
1 to 1¾ by ¼ and 5-16 inch	1 80
¾ to ⅞ by ¼ and 5-16 inch	1 90
½ to ⅝ by ¼ and 5-16 inch	2 15

Hoops.

1¼ to 4, Nos. 13 to 15	2 40
1¼ to 2, Nos. 16 to 18	2 45
1¼ to 2. No. 19	2 50
1¼ to 2, No. 20	2 50
1¼ to 2, No. 21	2 60
1¼ to 2, No. 22	2 70
15-16, 1 and 1⅛, Nos. 13 to 15	2 45
15-16, 1 and 1⅛, Nos. 16 to 18	2 50
15-16, 1 and 1⅛, Nos, 19 and 20	2 60
15-16, 1 and 1⅛, No, 21	2 70
15-16, 1 and 1⅛, No. 22	2 80
⅞, Nos. 13 to 15	2 60
⅞, Nos. 16 to 18	2 70
⅞, Nos. 19 and 20	2 80
⅞, No. 21	2 90
⅞, No. 22	3 00
13-16, Nos. 13 to 15	2 70
13-16, Nos. 16 to 18	2 80
13-16, Nos. 19 and 20	2 90
13-16 No. 21	3 00
13-16, No. 22	3 10
¾, Nos, 13 to 15	2 80
¾, Nos. 16 to 18	2 95
¾, Nos. 19 and 20	3 00
¾, No. 21	3 10
¾, No. 22	3 25
11-16, Nos. 13 to 15	3 05
11-16, Nos 16 to 18	3 10
11-16, Nos. 19 and 22	3 20
11-16, No. 21	3 30
11-16, No. 22	3 40
⅝, Nos. 13 to 15	3 10
⅝, Nos. 16 to 18	3 20
⅝, Nos. 19 and 20	3 30
⅝, No. 21	3 40
⅝, No. 22	3 50
⅝, No. 23	3 60

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 95
1½ to 6 by Nos. 11 and 12	2 00
1 to 1⅜ by ⅛ to 3-16 inch	2 00
1 to 1⅜ by Nos. 11 and 12	2 05
⅞ and 13-16 by ⅛ to 3-16 inch	2 15
⅞ and 13-16 by Nos. 11 and 12	2 20
¾ and 11-16 by ⅛ to 3-16 inch	2 25
¾ and 11-16 by Nos. 11 and 12	2 30
⅝ and 9-16 by ⅛ to 3-16 inch	2 40
⅝ and 9-16 by Nos. 11 and 12	2 45
½ by ⅜ to 3-16 inch	2 55
½ by Nos. 11 and 12	2 60

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 20
⅞ inch, " " " " 13 and 14	2 30
¾ inch, " " " " 11 and 12	2 35
¾ inch, " " " " 13 and 14	2 55

Sheet Iron.

No. 10 to 14	2 35
No. 15 to 17	2 40
No. 18 to 21	2 60
No. 22 to 24	2 70
No. 25 to 26	2 80
No. 27	2 90
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1, " "	2 50
C H Flange, " "	3 50
Extra Flange "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

Brainard Milling Machine Co.

EXHIBIT AT

- Machinery Hall, World's Fair, -

COLUMN K 39.

Plain and Universal Milling Machines,

Automatic Gear Cutting Machines,

Special Cam Cutting Machines.

These machines can be seen in operation.

WORKS AT HYDE PARK, MASS.

CHICAGO OFFICE, 14 S. Canal St.

BOSTON OFFICE, 156 Oliver St.

The Iron Trade Review,

CLEVELAND, O. -:- CHICAGO, ILL.

A successful career of **24** years, and a larger advertising patronage and paid subscription list than ever are guarantees to advertisers that this is a medium giving

VALUE RECEIVED.

In the Foundry, Machine Shop, Rolling Mill, Blast Furnace and Iron Ore Interests, its circulation is large and growing. Advertising in THE IRON TRADE REVIEW **Pays.**

HERCULES POWDER

SEND FOR DESCRIPTIVE PAMPHLET.

Stump before a blast. | Fragments after a blast.

STRONGEST and SAFEST EXPLOSIVE Known to the Arts.

POWDER, FUSE, CAPS, Electric Mining Goods,

AND ALL TOOLS FOR STUMP BLASTING,

FOR SALE BY THE

HERCULES POWDER COMPANY,

40 Prospect Street, Cleveland, Ohio.

J. W. WILLARD, Manager.

HERCULES, THE GREAT STUMP AND ROCK ANNIHILATOR.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ½ in. "	08½
7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in.	09½
⅝ to 11-16 and 4⅛	10
½ to 6 in.	10½
¼ to 9-32 and 6⅛ to 7 in.	11
3-16 in	13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes, tapered and bent	"	2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ lb 9@10
Wright's	℔ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 45
Munson's Short Lap Double and Light Double Leather	dis 50
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 30
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
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" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

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Pratt & Whitney	dis 10@15
Standard	dis 10@15
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Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

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Morse Taper and Straight Shank to 1⅛"	dis 50&10
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Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....15c
" " " " over 5 lbs.....12c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

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Brass and Copper.....dis 50
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American Packing Hemp.....₩ lb 9@10
Russia " " .....₩ lb 14
Italian " " .....₩ lb 13@19
Plumbago Piston.....₩ lb 40
Peerless.....₩ lb 60
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
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" 6 to 7 lbs.....$13 dis 60

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Iron Pulleys, Walker List.....dis 40
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17.....dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50&10@60
Copper.....dis 50@50&10

Saws.

Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
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" Diamond " .....30c "
" Tuttle Tooth Cross-cuts.....25c "
" One-man Cross-cuts.....12c "
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Derfection " .....$15 "
Petroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Jan. 18, 1884

Brass.....dis 30
Copper.....dis 40
Bright and annealed, Nos. 0@18.....dis 70&10@75
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65& 5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ₩ lb dis 30

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Bemis & Call's Combination	dis 35
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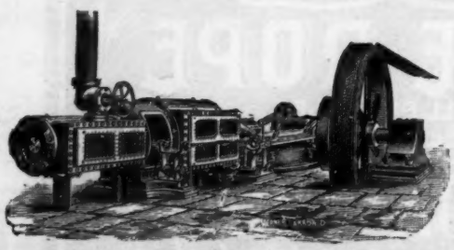
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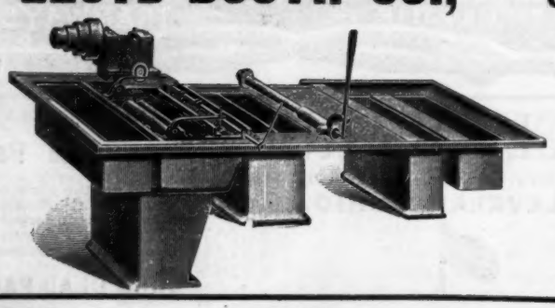
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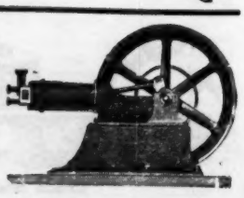

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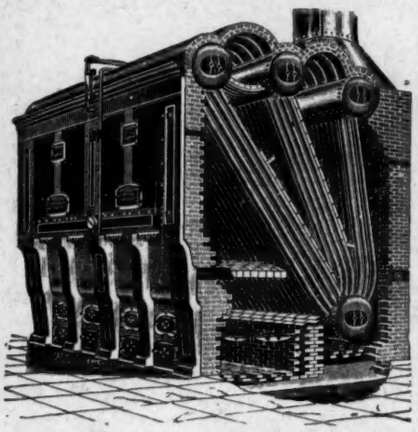

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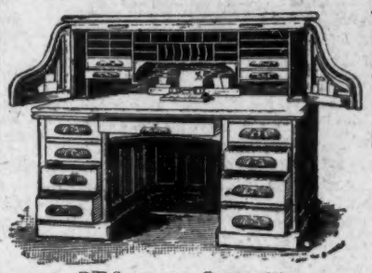

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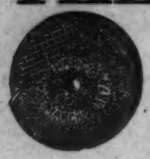

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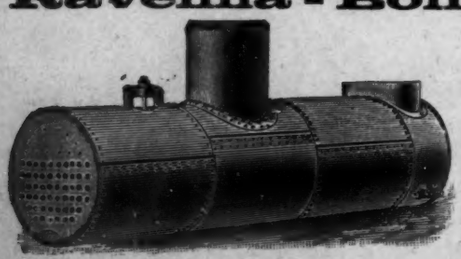

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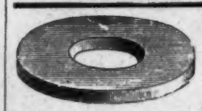

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